UNIVERSITY OF NEBRASKA AGRICULTURAL LIBRARY
SEP 5 1946

DYESTUFF REPORTER

GUST 12, 1946
LUME 35, No. 16

PONSOL* Yellow 3R Paste

Recommended for cotton and viscose-process rayon materials . . . for curtains, awnings, draperies, and upholstery fabrics, as well as dress goods and sportswear.

In addition to excellent fastness to light, good fastness to washing, chlorine, and crocking, PONSOL Yellow 3R Paste has good level-dyeing characteristics, a medium rate of exhaust, and can be applied in all types of dyeing equipment.

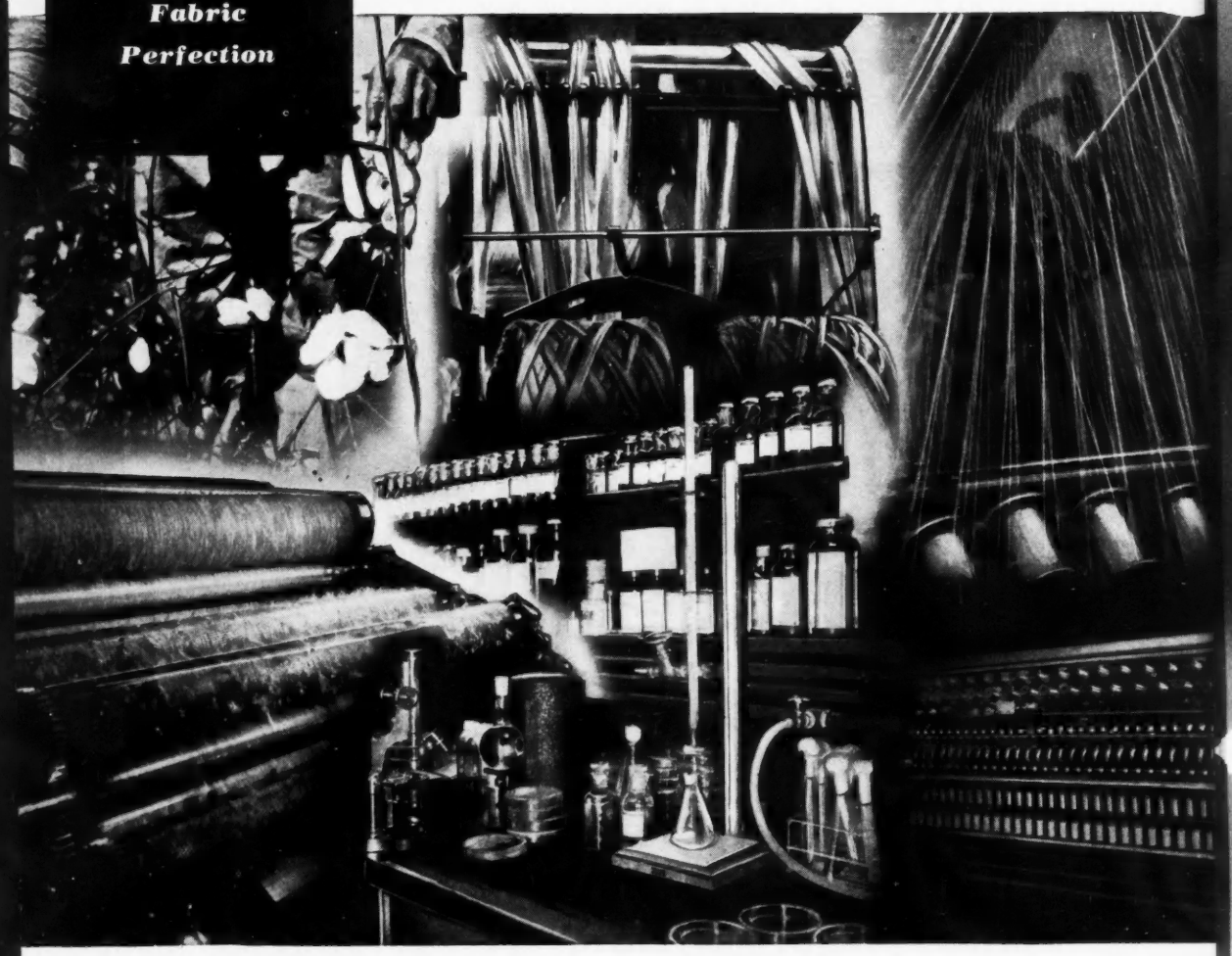
Our representatives will be glad to provide you with more information on this new product. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division Wilmington, 98, Delaware.

DU PONT

*REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

CHEMICAL RESEARCH *for Fabric Perfection*



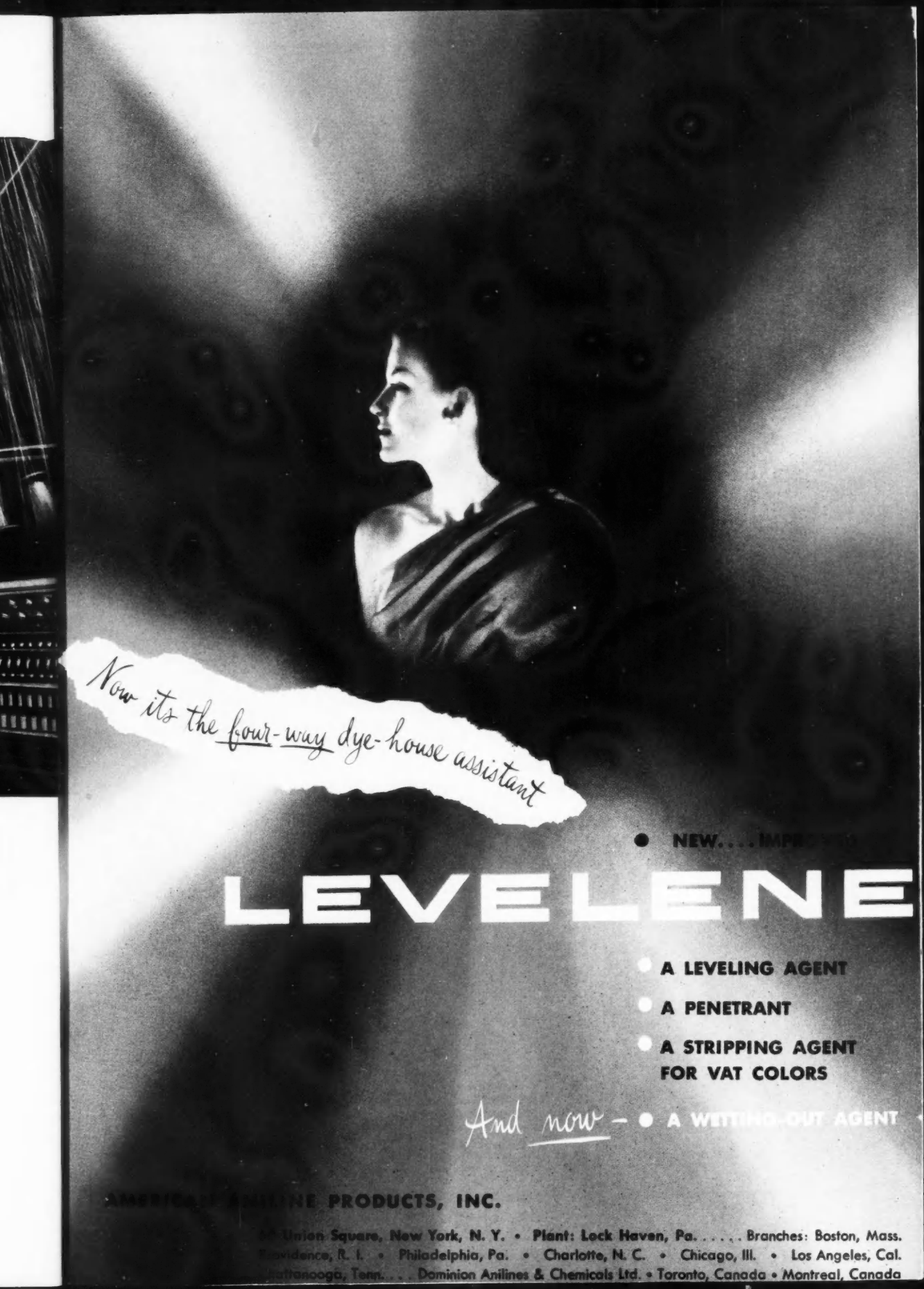
FORMASETS

Formasets, synthetic resin finishes for textiles, are again available without restriction. Several new types developed as a result of Warwick's war-time research have been added. Each Formaset has its particular advantages designed to solve specific finishing problems. Warwick technical advisors will gladly work with you in determining the correct Formaset for your needs.

WARWICK CHEMICAL COMPANY

A Division of Sun Chemical Corporation

80 FIFTH AVENUE, NEW YORK 19, N. Y.


Now its the four-way dye-house assistant
NEW.... IMPR
LEVELENE
A LEVELING AGENT
A PENETRANT
A STRIPPING AGENT FOR VAT COLORS
And now – A WETTING-OUT AGENT
PRODUCTS, INC.
Union Square, New York, N. Y. • Plant: Lock Haven, Pa. . . . . Branches: Boston, Mass.
Providence, R. I. • Philadelphia, Pa. • Charlotte, N. C. • Chicago, Ill. • Los Angeles, Cal.
Chattanooga, Tenn. . . . Dominion Anilines & Chemicals Ltd. • Toronto, Canada • Montreal, Canada

NYANZA

ANILINE & ALIZARINE COLORS

•

TEXTILE CHEMICALS

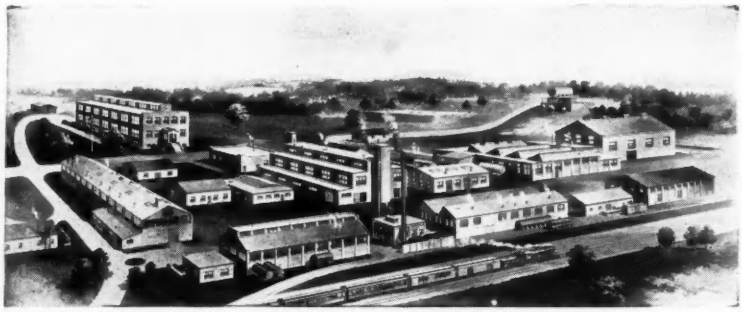
•

FINISHING MATERIALS

FOR

WOOL — COTTON — RAYON — ACETATE

AND MIXED FIBERS



FACTORY AT ASHLAND, MASSACHUSETTS

NYANZA COLOR & CHEMICAL COMPANY, Inc.

215 WATER STREET NEW YORK CITY

FACTORIES:

CHEMICAL MANUFACTURING CO., ASHLAND, MASS. • NEW BRUNSWICK CHEMICAL CO., NEWARK, N. J.

BRANCHES:

Ashland, Massachusetts

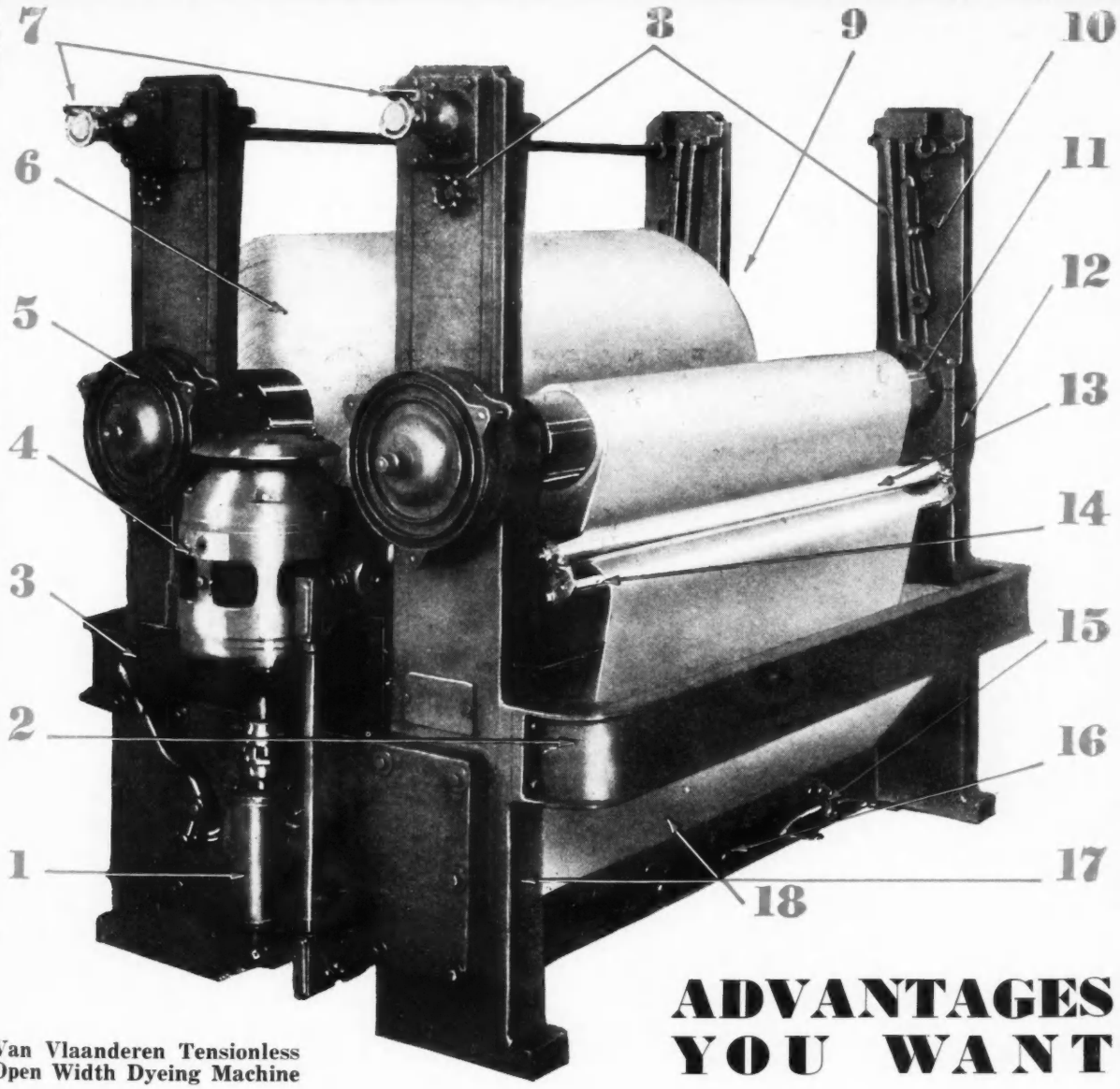
549 West Randolph St., Chicago, Ill. • 635 Drexel Bldg., Philadelphia, Pa. • 115 S.W. Fourth Ave., Portland, Ore.

2657 Magnolia Ave., Knoxville, Tenn. • 304 E. Moorehead St., Charlotte, N. C.

CANADIAN AGENTS:

Charles Albert Smith Limited, 123 Liberty St., Toronto, Canada

American Dyestuff Reporter, Vol. 35, No. 16, August 12, 1946. Published every other Monday. Copyright 1946, by Howes Publishing Co., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00; Foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.



Van Vlaanderen Tensionless Open Width Dyeing Machine

ADVANTAGES YOU WANT

1. Main Drive assembled entirely on ball bearings, hardened and ground gears, worms and shafts—running in a bath of oil. Designed to give a tensionless and constant cloth speed.
2. Two heavy cast iron girts, which support frames and tub, designed as troughs to receive overflow from tub, dispensing liquor to sewer.
3. Chain drive to batch rolls and take up totally enclosed, running in oil.
4. Individually—vertical mounted ball bearing motor, directly connected to main drive through a flexible coupling.
5. Twelve-inch diameter brakes mounted on a free wheeling arrangement.
6. Wide centers of batch rolls to accommodate a 36" diameter cloth roll.
7. Loading of machine from let off bar may be either constant or variable speed, simply by engaging or disengaging clutch.
8. Batch guides on angle and latch lock for safety of batched rolls.
9. Brake and starting controls on same end of machine.
10. Heavy batch up and take up brackets.
11. Extra heavy steel batch rolls with hard rubber covering extending over heads.
12. Stainless steel oscillating and submersion brackets, supported on frame.
13. Heavy gauge stainless steel idler rolls, roller bearings and housings.
14. Adjustable stainless steel curved bar.
15. Foot controlled dump lever, operated from either side of machine.
16. Two cast iron girts, supporting frames and tubes.
17. Heavy cast iron box type main frames.
18. Tub of heavy gauge stainless steel with ground and polished welded seams.
19. Controls—manual, or set to stop or reverse automatically at the end of each run.

VAN VLAANDEREN MACHINE CO.

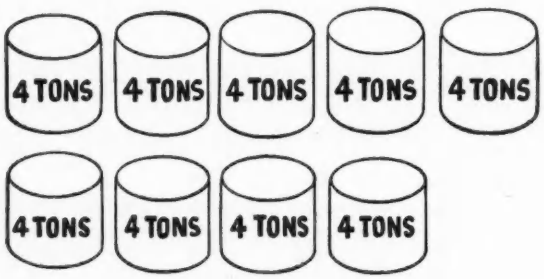
370 STRAIGHT STREET, PATERSON, N. J.

World's largest manufacturer of machinery for processing modern fabrics

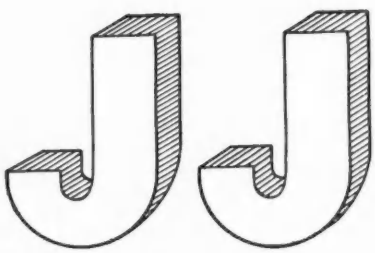
441452

DO YOU HAVE ALL THE FACTS ON CONTINUOUS BLEACHING?

Do you know the savings possible with a Butterworth Continuous Bleaching Range—savings in equipment, floor space, steam, chemicals and labor?

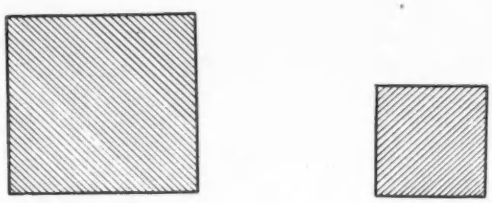


NINE 4-TON KIERS



TWO 3,000-Lb. "J"-BOXES

EQUIPMENT: In kier bleaching, it takes nine 4-ton kiers to achieve a daily production of 36 tons of 5.0 yard goods. In a Butterworth Continuous Bleaching Range, two "J"-boxes will do the same work.

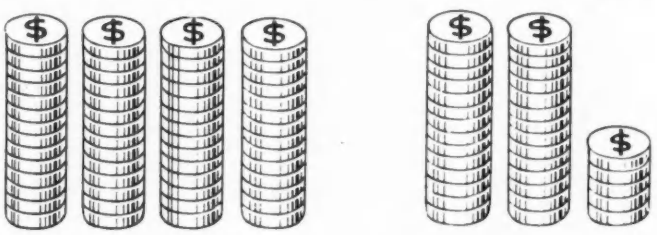


3,000 Sq. Ft. **1,350 Sq. Ft.**

FLOOR SPACE: A Butterworth Continuous Bleaching Range requiring 1,350 square feet of floor space does the work of nine 4-ton kiers requiring 3,000 square feet of floor space — a 55 per cent saving.

288,000 Lbs. **70,560 Lbs.**

STEAM: To bleach 1,000 pounds of cloth in kiers requires 4,000 lbs. of steam. To bleach 1,000 lbs. of cloth in a Butterworth Continuous Bleaching Range requires only 980 lbs. of steam.



UP TO 40% LESS

CHEMICALS AND LABOR: Savings up to 40 per cent in the cost of chemicals and labor are achieved in Butterworth Continuous Bleaching Ranges. In kier boiling, if the bleach is not satisfactory there is a time loss of 18 to 24 hours. In continuous bleaching, there are inspection windows in the "J"-boxes to permit checking at any stage and each yard or goods is bleached in approximately two hours.

•

Butterworth equipment for Continuous Bleaching Ranges includes "J"-Boxes, Washers, Caustic and Peroxide Saturators, and Heater Tubes. The new and improved "J"-Boxes are made of heavy gauge stainless steel which gives added strength . . . prevents retarding formerly caused by bulging and buckling. The latest type horizontal 6-roll washer is equal to about four conventional boxes, and uses air pressure for greater control of the rolls.

The economies afforded by Butterworth Continuous Bleaching Ranges (either DuPont or Becco Process) are the result of 126 years experience in the Wet End of Textile Finishing. These savings and this experience can be yours. Write us today.

BUTTERWORTH

H. W. BUTTERWORTH & SONS COMPANY, Philadelphia 25, Pa.

TEXTILE FINISHING MACHINERY COMPANY DIVISION, Providence, R. I. • 1211 Johnston Bldg., Charlotte, N. C. • W. J. Westaway Co., Hamilton, Ont. • ARGENTINA: Storer & Cia., Chacabuco 443-49, Buenos Aires • BOLIVIA: Schneiter & Cia., Ltda., La Paz • BRAZIL: Oscar Bandler, Caixa Postal 3193, Sao Paulo • CHILE: Schneiter & Cia., Ltda., Casilla 2864, Santiago • COLOMBIA: C. E. Halaby & Co., Apartado 139, Medellin • ECUADOR: Richard O. Custer, S. A., Quito. MEXICO: I. Slobotzky, Avenida Uruguay 55, Mexico, D. F. • PERU: Custer & Thommen, Casilla 733, Lima • URUGUAY: Storer & Cia., Ltda., Calle Paysandu 1022, Montevideo • VENEZUELA: Herbert Zander & Co., Apartado Postal 1291, Caracas.

Fabrics treated with aerotex† softener H

AEROTEX† SOFTENER H imparts unparalleled softness of hand and suppleness of drape to wool, cotton and rayon textiles. Because of these qualities, fabrics treated with AEROTEX SOFTENER H are already enjoying a new and greater customer satisfaction the country over.

For example, *Cohama Bamboo*, "the fabric of tomorrow"... here today—is silky to the hand... light in texture... and has appealing softness because it has been treated with AEROTEX SOFTENER H. No wonder then, that men choose it unhesitatingly for their personal wardrobes.

As a durable, synthetic type softener, AEROTEX SOFTENER H fills a long felt need in the textile industry. It combines readily with most of the synthetic resins, and does not discolor white goods nor interfere with crease-resistant properties. AEROTEX SOFTENER H also serves as an excellent wetting agent.

Especially desirable for apparel fabrics requiring maximum softness.

AMERICAN CYANAMID COMPANY
TEXTILE RESIN DEPARTMENT
BOUND BROOK, NEW JERSEY
New York • Boston • Philadelphia • Providence • Charlotte • Chicago

LANASET Resin • SHEERSET† Resin*
AEROTEX† Softener H • LACET† Resin

**Reg. U. S. Pat. Off. †Trade-mark of American Cyanamid Company*

INDANTHRENES

for work clothes

INDANTHRENES

for sport clothes

INDANTHRENES

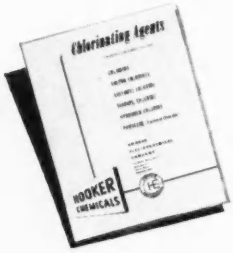
for couturiers' creations

Indanthrenes enhance the value of every fabric to which they are applied.

GENERAL DYESTUFF CORPORATION

1946

For Chlorine in Convenient-to-Use Form Use Hooker Sulfur Chlorides



The Hooker Sulfur Chlorides, mono- and di-, provide convenient sources of chlorine in chemical processes where the use of elemental chlorine is not feasible. In these Hooker products you can always be sure of a carefully controlled chlorine content. The Monochloride contains a minimum of 50% chlorine, while the Dichloride has a minimum of 66% chlorine.

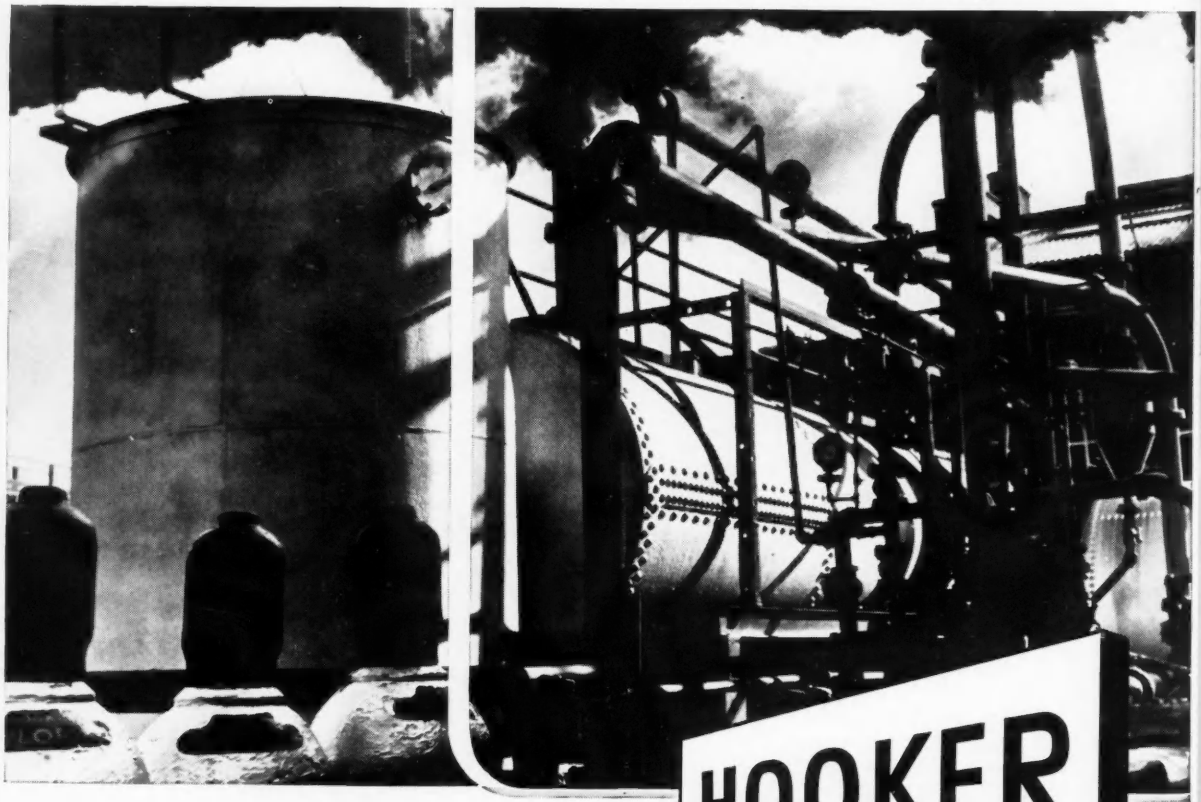
Besides the more common uses as chlorinating agents, the Sulfur Chlorides have a wide variety of possible applications in many different fields. In reactions with unsaturated hydrocarbons it is possible to introduce the sulfur or chlorine or both into the molecule.

Sulfur Dichloride may be used as a chloridizing agent in the refining of various sulfide ores; as a reagent in the manufacture of organic acid anhydrides, various rubber substitutes and other organic chemicals.

Sulfur Monochloride is also used in the manufacture of a variety of organic chemicals. It has been used as an agent for the cold vulcanization of rubber products and in the manufacture of rubber substitutes. It may be used as a solvent for sulfur and as a polymerization catalyst to increase the viscosity of fatty acids.

Hooker Bulletin 328A, "Chlorinating Agents," gives more detailed information on the possible uses of these two Hooker products as well as other Hooker Chlorinating Chemicals. Technical Data Sheets Nos. 759 and 760 describe in more detail the physical properties of the Hooker Sulfur Chlorides. Copies of these bulletins will be sent when requested on your business letterhead. Your problems in handling these Hooker Chemicals will receive the careful attention of our Technical Staff.

A part of the Hooker facilities for the production of chlorinated compounds.



HOOKER ELECTROCHEMICAL COMPANY

2 Forty-seventh St., Niagara Falls, N. Y.

New York, N. Y. • Wilmington, Calif. • Tacoma, Wash.

Caustic Soda **Muriatic Acid** **Sodium Sulfide**
Paradichlorbenzene **Chlorine** **Sodium Sulfhydrate** 3038

HOOKER CHEMICALS

Photo Courtesy Charlotteaville Woolen Mills

Use S/V Woolrex Oils to Lubricate and condition your wool stocks

Here, on the spinning frames, you can count on S/V Woolrex Oils to increase yarn strength and reduce yarn breakage to a minimum.

The reason: These outstanding wool oils penetrate uniformly into each individual fibre of your stock. They keep the fibres soft and pliable during spinning, so that the rovings draw out evenly without breaking.

On the cards, you get longer runs before stripping is necessary. These oils are free from gum-forming tendencies. Wool oiled with these products will not discolor in long storage.

S/V Woolrex oils scour out easily in conventional operations with minimum amounts of soap. Get full details from your Socony-Vacuum Representative.

Better, Lower-Cost PROCESSING for ALL Textiles

WOOLENS
S/V Woolrex Oils

Improve carding and spinning. Scour out easily.

★

WORSTEDS
S/V Worstex Oils

Lubricate stock uniformly, improve spinning.

★

WATER REPELLENTS
Special S/V Products

Give inexpensive water repellency.

★

FINISHING
S/V Finishing Oils

Plasticize starch mixtures.

★

SANFORIZED PROCESS
S/V Finishing Oils

Insure quick, uniform re-wetting during sanforized processes.

★

RAYON PROCESSING
S/V Rayon Oils

Lubricate, soften and deluster rayon fibers.

★

CORDAGE
Special Oils, Waxes

Provide waterproofing, lubrication and softening.

★

MILDEW PROOFING
S/V Copper-Naphthenates

Prevent fungus growth and increase fabric life.

SOCONY-VACUUM OIL CO., INC.
26 Broadway, New York 4, N. Y.
and Affiliates: Magnolia Petroleum Co., General Petroleum Corp. of Cal.

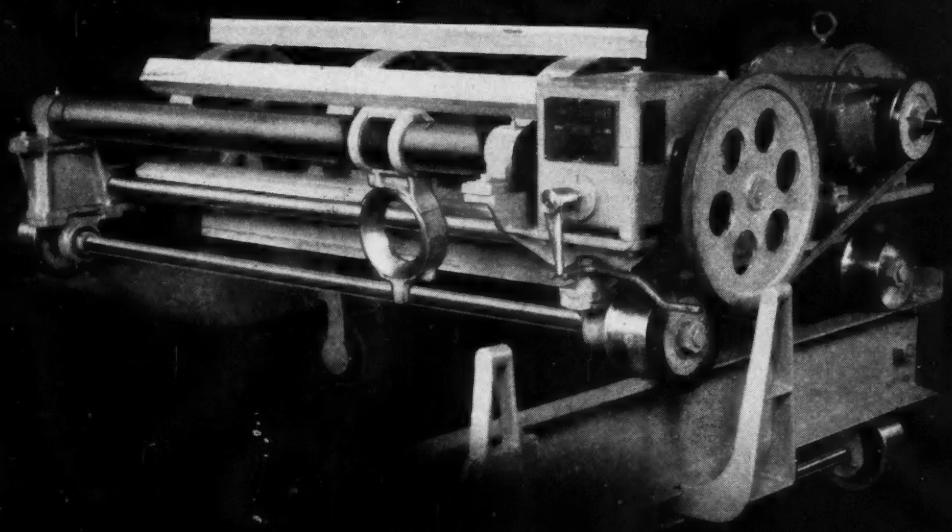
Tune In "The Mobilgas Program"
Monday Evenings, 9:30 E.D.T.—NBC

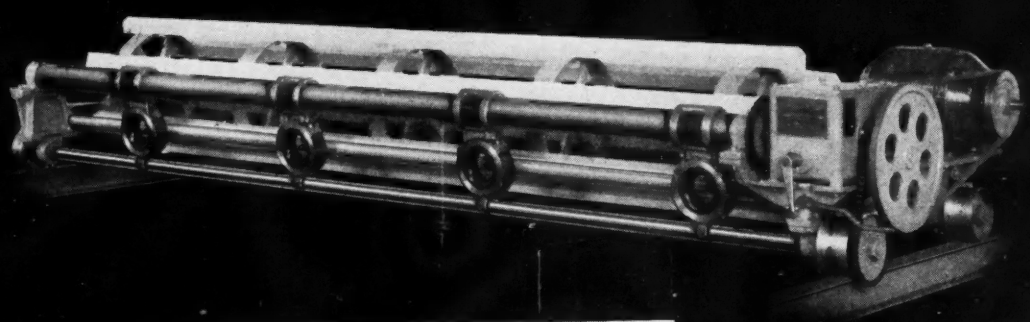
Process Products
SOCONY-VACUUM

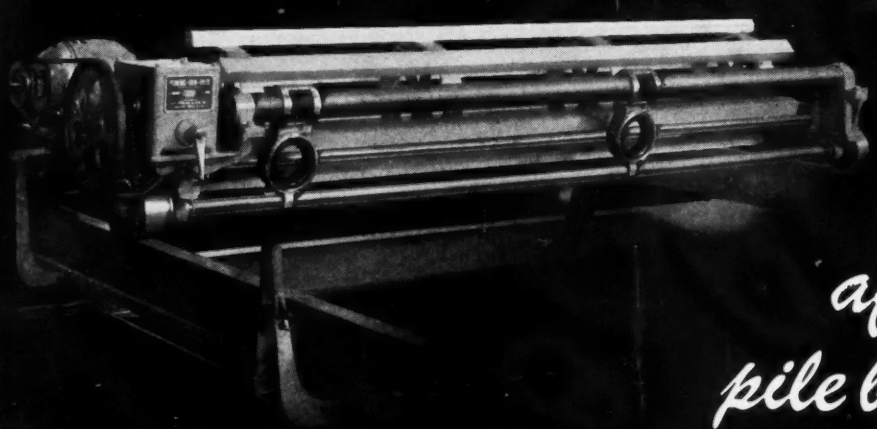
INVESTIGATE
SOCONY-VACUUM
PROCESS PRODUCTS
Research and Service

PERKINS AUTOMATIC BIN PILERS

PATENTED







You cannot afford to pile by hand

B. F. PERKINS & SON, INC.

ENGINEERS AND MANUFACTURERS

HOLYOKE • • • MASSACHUSETTS

WHETHER YOU HANDLE...

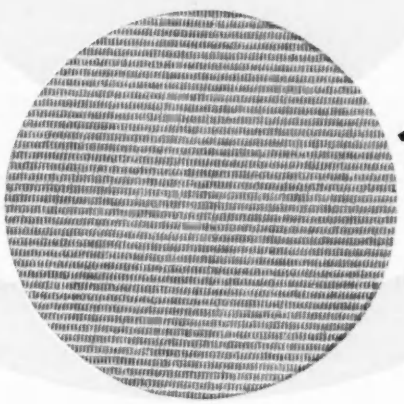
COTTON

WOOL

Bleach it with

BECCO HYDROGEN PEROXIDE

KNIT GOODS



RAYON

Why not take advantage of Becco's many years of specialized bleaching experience? Ask our engineers and chemists to advise you what method of bleaching is most suitable for processing your goods, regardless of the type of fibre used. This expert bleaching "know-how" can be yours, free. Write to:

BECCO

BECCO SALES CORPORATION

AGENTS FOR BUFFALO ELECTRO-CHEMICAL CO., INC.

2 Sawyer Avenue, Buffalo 7, N. Y.

New York Boston Philadelphia Chicago Charlotte

you'll get REAL YARN PROTECTION

(Photograph courtesy Universal Winding Co., Providence, Rhode Island)

Here are some of the principal reasons why NOPCO Nylon Coning Oil can be a big help to you in attaining better coning and knitting results.

A firmer bonding material. NOPCO Nylon Coning Oil tends to bind the size to the nylon yarn. This binding action results in minimum flaking, adequate and lasting yarn lubrication.

Non-emulsifying. *Insoluble* NOPCO Nylon Coning Oil checks the over-plasticizing effect of water on the size during knitting. Result—less stripping, rapid fabric drying. This makes for both reduced roll and increased snag resistance.

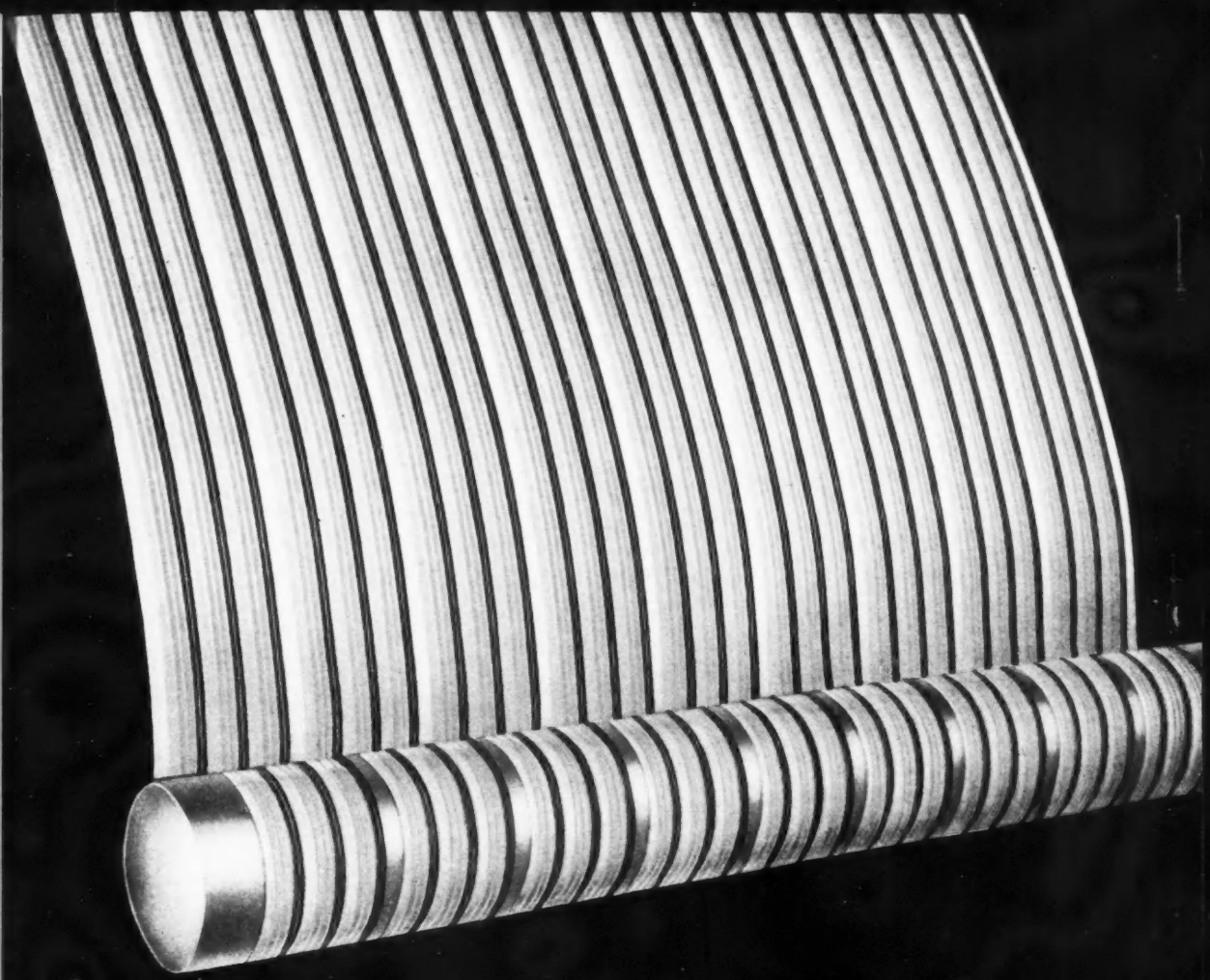
Clear, even stitch formation. This is another advantage assured because NOPCO Nylon Coning Oil gives essentially uniform lubrication throughout the coning process. That's how NOPCO Nylon Coning Oil *really protects yarn* . . . how it gives valuable aid in keeping product volume and quality up and production costs down.

"BOOM DAYS" for nylon lie ahead. Competition will be keen. It will pay you to give your nylon yarn the protection of a dependable coning oil such as Nopco. For further particulars write address below:

NATIONAL OIL PRODUCTS CO.
HARRISON, N. J.
Branches: Boston • Chicago • Cedartown, Ga. • Richmond, Calif.

NOPCO CONING OIL
FOR NYLON YARN PROTECTION

NOPCO **EVOLVED THROUGH RESEARCH**
*REG. U. S. PAT. OFF.



DOES YOU PRINT THIS SHIRTING PATTERN WITH ONE ROLL OR THREE ?

produce this pattern with conventional
's, you'd make three engravings, print as a
olor job, age, soap and dry. But Clearwater
nufacturing Company used a far simpler,
expensive method. They made a mill-and-
engraving in three depths to provide three
dations in shade, and printed with Aridye*
ment Colors on a *single printing roll!*
The formula used to print this pattern was
dye green FJ3B cut 1:5 with regular Aridye
ur. Goods were dried on cans; no aging
or soaping was necessary. The results were:

1. Thousands of yards of shirting with a sharp, well-defined pattern, which met or exceeded all of the usual fastness requirements.
2. Danger of one color running into another was entirely eliminated.
3. Printing costs were reduced.

This is but one of many examples showing how Aridye Pigment Colors are being used to advantage in every-day printing jobs
men are also finding out that Aridye Pi
Colors are the answer to unusual printing
lems which would be difficult or impossi
solve by the use of ordinary dyes or co
tional methods.

Why not have an Aridye technical s
man discuss your printing and dyeing
lems with you? Write to Aridye Corporat
Pioneers in Pigment Colors for Text
Fair Lawn, N. J.

g. U. S. Pat. Off.

CHECK THESE 8 ADVANTAGES

Sharpness of Mark • Exceptional Fastness to Sunlight
Uniformity of Shade • Fastness to Washing • Bright Colors
Economy • Ease of Application • No Impairment of Hand

Aridye
Pigment colo

DYE CORPORATION • A SUBSIDIARY OF INTERCHEMICAL CORP. FAIR LAWN N. J. • ROCK HILL S. C. • PROVIDENCE

DURABLE WATER REPELLENCY

YOU CAN GIVE cotton, viscose, acetate and rayon, as well as all other fibres and fabrics, effective and durable water repellency by a simple treatment on jig, pad or quetsch with

REPEL-O-TEX D3 and D4

These two materials are used in combination. A full dip with good impregnation on properly prepared cloth is the only treatment required. The finish is effective, durable and both stain and perspiration resistant as well.

No After Treatment – Goods treated with the recommended formula for Repel-O-Tex D3 and D4 require no baking or after treatment subsequent to jigging, padding or quetsching. They are handled in the normal manner.

Lasting Effects – Suitably prepared cloth, treated in accordance with directions, will have water repellent properties with a spray rating of 100. After three dry cleanings (U. S. Army Specifications) or three washings (at 100°F. with 0.1% soap and 0.05% soda ash) the rating will be 70 or better.

Write for the complete story on REPEL-O-TEX D3 and D4

Other ONYX SPECIALTIES for Textile Finishing

THE ONYXSANS

Cation-active softening agents for imparting lasting softness, smoothness and drape to fabrics impossible to improve by other methods. Onyxsan finishes improve the hand, not by a superficial oiling of the yarn, but by properties produced IN the yarn itself.

ONYX OIL & CHEMICAL COMPANY

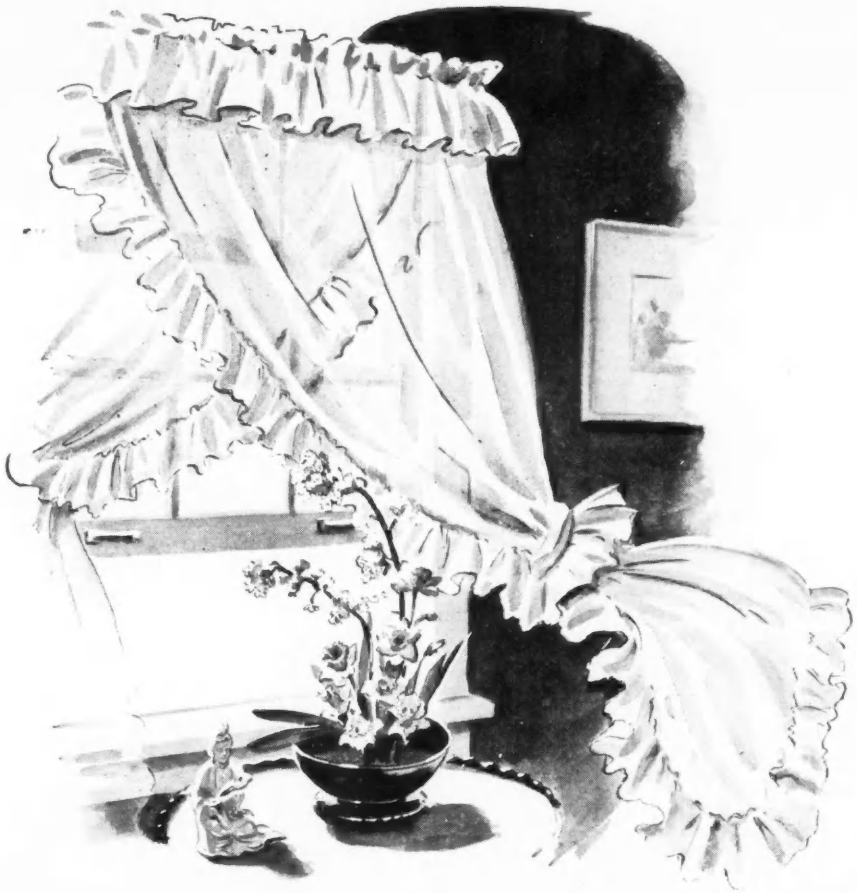
JERSEY CITY 2, N. J.

CHICAGO • PROVIDENCE • CHARLOTTE • ATLANTA

In Canada: ONYX OIL & CHEMICAL CO., LTD.—MONTREAL, TORONTO, ST. JOHNS, QUE.

For Export: ONYX INTERNATIONAL, JERSEY CITY 2, N. J.

onyx **CHEMICALS FOR DYEING AND FINISHING**



Customers find curtains stay flower-fresh longer if they're protected with DRAX

Trademark Reg. U.S. Pat. Off.

Sudden showers and dusty breezes don't worry DRAX-treated curtains. Their invisible wax finish protects them from rain and dirt. Curtains stay clean longer . . . so they stay *up* longer . . . need less frequent washings so they *last* longer! All these are benefits customers really appreciate.

You'll find that DRAX gives superior results in use. Tests conducted by an independent laboratory showed that DRAX produced a water-repellency exceeding Army specifications for initial spray rating. It is easy and inexpensive to use and may be applied, not only to cellulose fibres, but to *any* textile.

DRAX is made by the makers of Johnson's Wax. Technically, it is a simple wax emulsion, non-flammable, stays stable in solution. Textile mills already using it find that DRAX adds a profit-plus to the fabric without being difficult or expensive to use. It will pay you to find out about DRAX now.

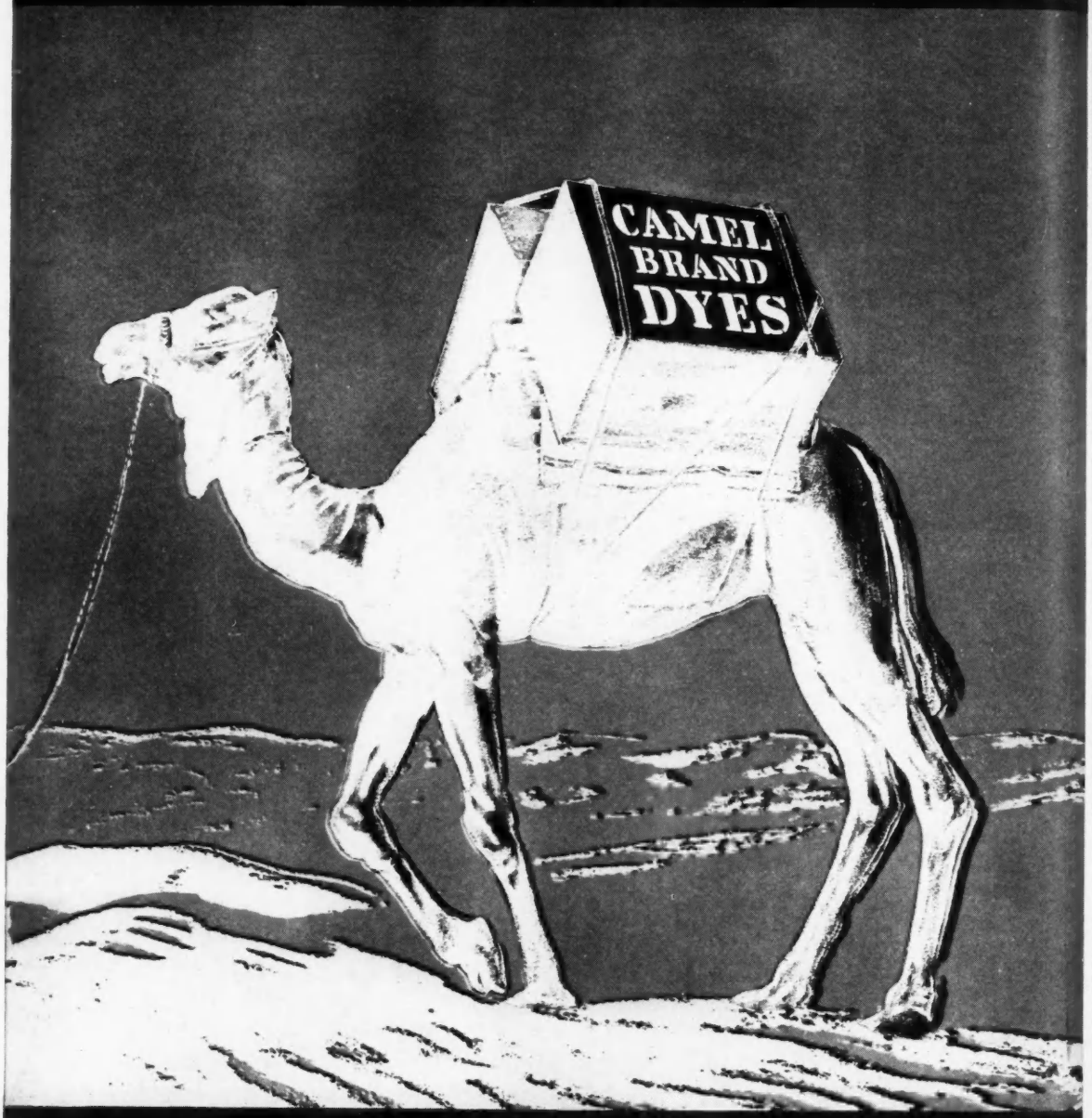
S. C. JOHNSON & SON, Inc.
Fabric Finishes Division, Racine, Wisconsin
Starrett Lehigh Bldg., 601 W. 26th St., New York 1
Or any of our other 18 district offices
Also S. C. Johnson & Son, Ltd., Brantford, Ont., Can.

This DRAX tag is a sign of plus *value!*

DRAX is made by the makers of Johnson's Wax (a name everyone knows)

QUALITY DYESTUFFS

SINCE 1878



JOHN CAMPBELL & COMPANY, Inc.

75 HUDSON STREET • NEW YORK CITY

TELEPHONE: BArclay 7-6228-6229

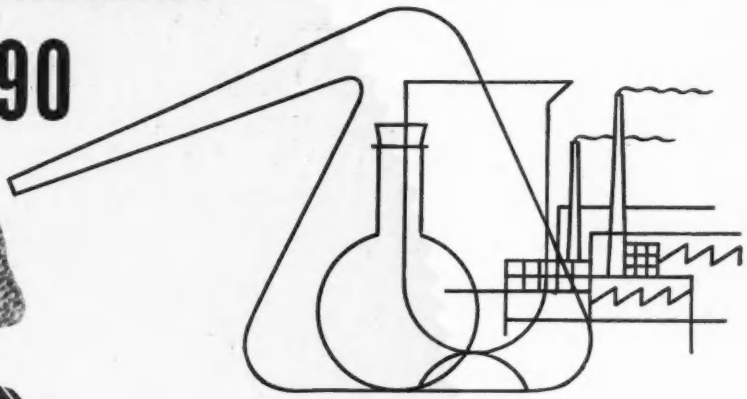
PHILADELPHIA: BROAD AND SPRING GARDEN STS.

BRANCH OFFICES AND WAREHOUSES:

BOSTON EAST CLEVELAND, OHIO ATLANTA, GA.

PATTERN FOR PRODUCING BRIGHTER PRINTS... TO WITHSTAND LAUNDERING

VELVAMINE K90



This finishing and softening agent for all fabrics has a minimum effect on shade and light fastness of direct colors.

Prints are brighter and the finish is resistant to washing and dry-cleaning.

Especially recommended for starch and resin mixtures used in preparing materials for Sanforizing process, as it penetrates uniformly.

An excellent agent for rayon and cotton, used prior to spooling and knitting, where elasticity is desired.

REFINED PRODUCTS COMPANY

Lyndhurst • New Jersey

***Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent**

Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I. / CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Berkeley Products Canada, Ltd., 41 Hillcrest Avenue, St. Catharines, Ontario, Canada • Exporting Agent: Chem-Col Company, 82 Wall St., New York City

DYED ACETATE RAYON!

finished with

ARIPEL-FS

Reg. U.S. Pat. Office

Has Excellent Fastness to Atmospheric Gases

Yes, acetate rayon dyed fabrics treated with double-action ARIPEL-FS are remarkably resistant to the fading action of atmospheric gases as proven by the "Gas Chamber" test.

ARIPEL-FS is also an effective softener and therefore works two ways in a one bath treatment —

- **Increases the gas-resistance of the color.**
- **Imparts a soft, smooth pleasing finish.**

ARKANSAS CO. INC.

Manufacturers of Industrial Chemicals for over 40 Years

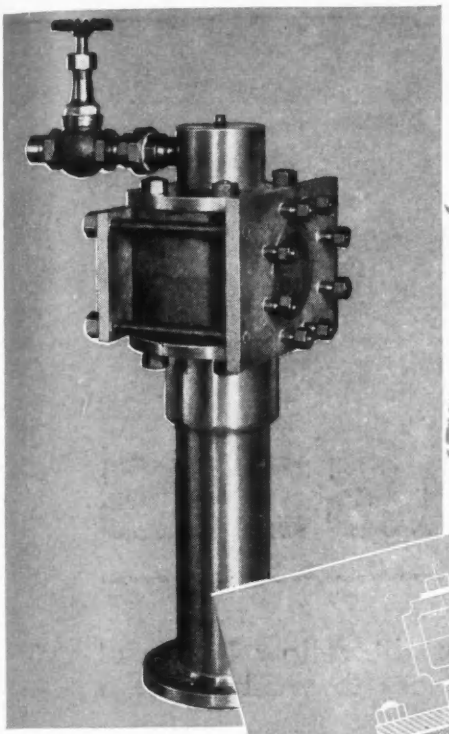
Newark, New Jersey

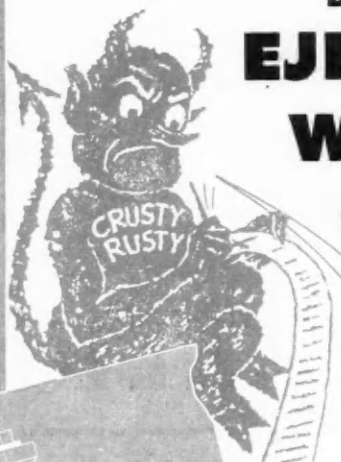
'The time has come, the Walrus said,
'To talk of many things:
Of shoes—and ships—and sealing-wax—
Of cabbages—and kings—
Yes and textiles, shoes, papers, cosmetics,
foods, biological stains and everywhere
that color is used, National Aniline
is most likely to be the favored supplier.
With the industry's oldest and broadest
background in solving color problems, we
welcome use of our unduplicated experience.
WHEREVER COLOR IS USED
National Aniline
DIVISION OF
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET NEW YORK 6, N. Y.
BOSTON · PROVIDENCE · PHILADELPHIA · CHICAGO · SAN FRANCISCO · CHARLOTTE
GREENSBORO · ATLANTA · NEW ORLEANS · CHATTANOOGA · PORTLAND, ORE. · TORONTO
NATIONAL
Shoes by I. Miller

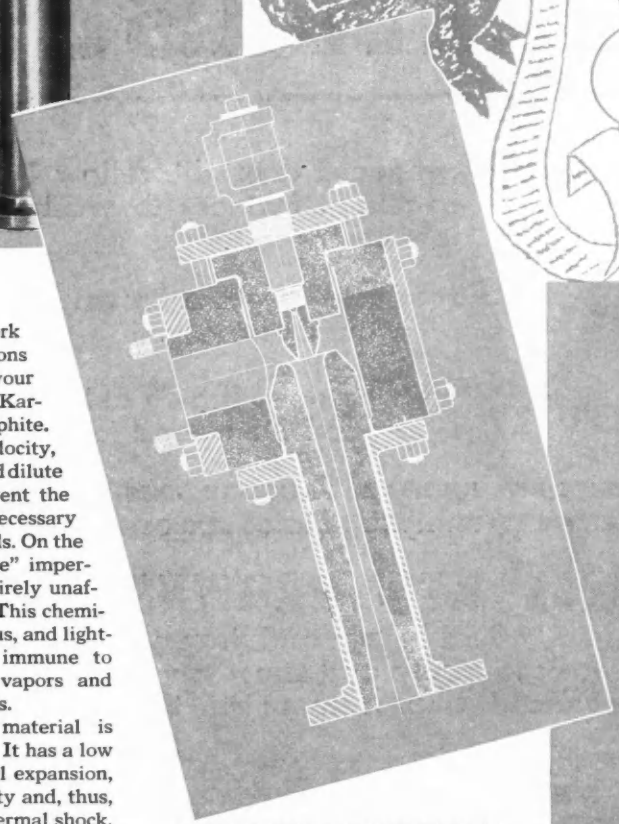
KARBATE

BRAND

EJECTORS WITHSTAND CORROSION





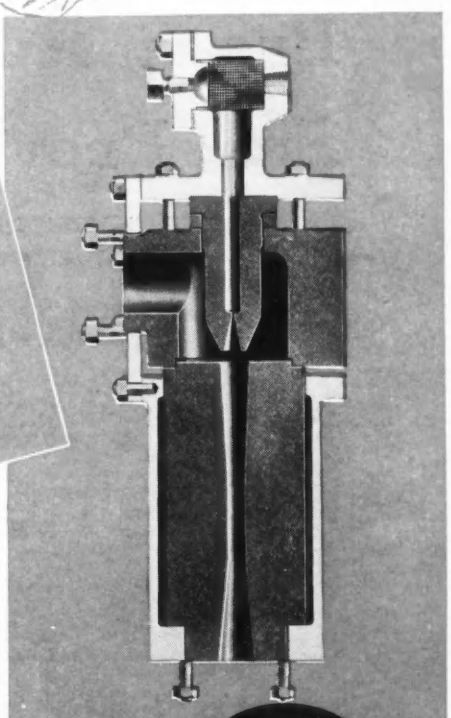


GUESS I'VE GOT TO CROSS 'KARBATE' EJECTORS OFF MY LIST!

● Wherever you work with corrosive solutions—it pays to have your ejectors lined with "Karbate" impervious graphite. For high steam jet velocity, high temperature, and dilute vapor mixtures prevent the formation of a film necessary to protect most metals. On the other hand, "Karbate" impervious graphite is entirely unaffected by corrosion. This chemically inert, non-porous, and lightweight material is immune to most general acid vapors and special caustic vapors.

Also, "Karbate" material is strong mechanically. It has a low coefficient of thermal expansion, high heat conductivity and, thus, high resistance to thermal shock. In fact, "Karbate" impervious graphite will resist heat shock better than *any* other available material.

Prolong the useful life of your ejectors — specify all exposed parts to be made of "Karbate" impervious graphite. For more details write Dept. AD.



"KARBATE" PRODUCTS ARE UNAFFECTED BY:

Hydrochloric, sulphuric, lactic, acetic, hydrofluoric acids, and by special caustic vapors and other corrosive liquids and gases.

They also withstand extreme heat shock.

WHATEVER YOUR PROBLEM — CONSIDER CARBON OR GRAPHITE

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation
The words "National" and "Karbate" are registered trade-marks of National Carbon Company, Inc.

UCC

30 East 42nd Street, New York 17, N. Y.
Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

Valuable additions to our line of . . .

Pharmasols

Brown 2G produces a bright yellow Brown of excellent fastness to washing at a low cost.

Brown R produces a warm Brown of general all-around fastness.

Seal Brown yields a deep Brown at low cost and is of good all-around fastness.

THE THREE NEW BROWNS PRODUCE DESIRABLE TAN SHADES WHEN PRINTED IN REDUCED STRENGTH

THESE NEW BROWNS, especially Seal Brown and Brown R, are easy to apply and show a very pronounced improvement in their

FASTNESS TO LIGHT

against our former Browns

CARBIC COLOR AND CHEMICAL CO., INC.

451-453 Washington Street, New York City

BRANCHES:
PHILADELPHIA
PROVIDENCE HAMILTON, ONT.
CHARLOTTE, N. C.

IMPORTERS OF THE MANUFACTURES OF
DURAND & HUGUENIN S. A.
BASLE, SWITZERLAND

EXCLUSIVE DISTRIBUTORS OF
PHARMASOLS
PHARMOLS
PHARMACINES

Representative: Los Angeles (Hathaway Allied Products)

AMERICAN DYESTUFF REPORTER

LOUIS A. OLNEY, D.Sc.
Directing Editor

NORMAN A. JOHNSON, B.T.C.
Managing Editor

MYRON D. REESER
Advertising Manager

GRACE B. BURTON
Production Manager

M. H. MORGAN
Circulation Manager

Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

Published every other Monday by
HOWES PUBLISHING COMPANY, INC.
One Madison Avenue, New York 10, N. Y.

A. P. HOWES
President

C. R. HOWES
Vice President

H. F. CRAWFORD
Treasurer

M. D. REESER
Secretary

C. ESSENBREIS
Asst. Secretary

Also Publishers of
KNIT GOODS WEEKLY
TEXTILE COLORIST
AND CONVERTER

AUGUST 12, 1946

VOLUME 35 NUMBER 16

Contents

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

• Special Article

Combination of Wool Protein with Heavy Metal Salts as a Function of pH..... 383
Kermit S. LaFleur

• Departments

Patent Digest 398
Paul Wengraf

Trade Notes—New Products 399

• Proceedings of the American Association of Textile Chemists and Colorists

Bleaching Textiles with Peroxides.....P388
Russell Mills

The Colorimetry of Fluorescent Samples.....P390
I. H. Godlove

Employment Register P393

Calendar of Coming Events.....P393

Outing, New York Section.....P393

Copyright, 1946, Howes Publishing Co., Inc.

CATION SOFTENER 686

DUAL PURPOSE NEUTRAL DURABLE FINISHING AGENT

•

Try this **DREW-TESTED** *softener in your own process!*

"Drew-Tested" Cation Softener #686 is a *neutral,* durable finishing agent that serves a dual purpose. Because unwanted reactions on shade and light fastness have been minimized in this product, it can be used advantageously:

(1) as a plasticizer or softener for urea-formaldehyde and melamine-formaldehyde crease-resistant treatments;

(2) as a finishing agent for cotton, wool and synthetics when extreme softness without oilness is desired.

Cation Softener #686 is an ideal product for quality finishing; it is durable, efficient and economical. Send for your sample today.

PENETRANTS • DYE ASSISTANTS • SCOURING COMPOUNDS • WOOL AND WORSTED OILS • FINISHES • SULFONATED OILS • TEXTILE SPECIALTIES

E. F. DREW & CO., INC.

***Main Office:* 15 East 26th Street, New York 10, N. Y.**

80 FEDERAL STREET
BOSTON 10, MASS.

FACTORY & LABORATORIES
BOONTON, N. J.

919 N. MICHIGAN AVE.
CHICAGO 11, ILLINOIS

I am interested in Cation Softener 686.

- ☐ Send complete information
- ☐ Send sample for mill trial
- ☐ Have technical representative call

Name .....

Company .....

Street .....

City ..... *State* .....

E. F. DREW & CO., INC.
BOONTON NEW JERSEY

DREW TESTED

AMERICAN
DYESTUFF REPORTER

VOLUME 35 AUGUST 12, 1946 NUMBER 16

Combination of Wool Protein with Heavy Metal Salts as a Function of pH

I–Copper Sulfate

KERMIT S. LaFLEUR

CONSIDERABLE data have been published which demonstrate quantitatively the progressively increasing attraction of wool for anions in solutions of decreasing pH[1, 2, 3], while a lesser amount may be found which demonstrates a progressively increasing attraction of wool for cations in solutions of increasing pH[1, 4, 5]. The data obtained by adding varying quantities of acid or base to a constant weight of wool in a solution brought to constant volume, and then measuring equilibrium conditions are called "titration" data, and are presented in the form of "titration" curves. The difference between the original solutions and those at equilibrium with wool is usually measured by titration.

The titration curves may reasonably be expected to approximate the dissociation curves of wool[6] in cases where reactions go to near-completion in the direction of the wool compound before equilibrium is reached, as in the case of wool and large organic ions like dyestuff anions.

By analogy with the difference exhibited between the titration curves of wool-hydrochloric acid and, say, wool-Orange II dye acid[3], the wool-sodium hydroxide titration curve probably marks a minimum of wool-cation combination compared to which the curve showing the dissociation of wool as an acid would probably indicate a considerably greater potentiality for combination. Figure 1 illustrates these relationships approximately.

One of the more interesting methods of attempting to work out empirically the dissociation curves of wool protein as a function of pH is to study its combination with salts of what are usually called complex-forming heavy metals (e.g. iron, cobalt, nickel, chromium, copper, manganese and others). In the woolen textile industry, chromium salts are of outstanding importance as mordants used to improve wash-fastness properties of dyestuffs having certain specific structural characteristics, and should claim first attention in such a list. However, since it seems desirable to examine at least two such mordants in preliminary experiments to permit comparisons and minimize the danger of incorrect interpretations and since the chemistry of copper compounds appears somewhat simpler than that of the other metals mentioned, it is convenient to examine a copper salt first.

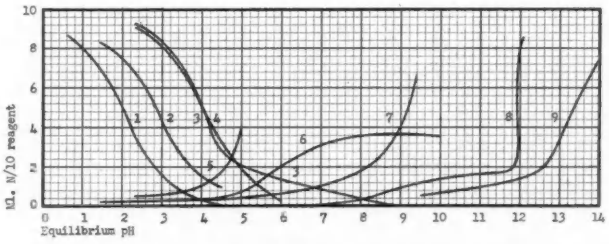
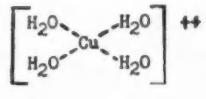
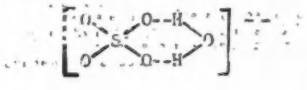


Figure 1. "Titration" curves of wool: (1) hydrochloric acid at 25°C[1a]; (2) naphthalene—β—sulfonic acid at 25°C[2b]; (3) Cochineal Red A, C.I. 185, rough preliminary curve from this laboratory; (4) Orange II dye acid at 50°C[3]; (5) Bismarck Brown, C.I. 331, rough preliminary curve from this laboratory; (6) Methylene Blue, C.I. 922[5]; (7) Methylene Blue, C.I. 922, rough preliminary curve from this laboratory; (8) sodium hydroxide at 22°C[1a]; and (9) potassium hydroxide at 0°C[1a].

Copper, in common with many other elements, has the property of attracting and holding about itself a definite number of oppositely charged ions, radicles, or "neutral" molecules through what are called "co-ordinate" (secondary) valance forces[7, 8], forming a relatively stable, complex ion of variable "electro" (primary) valence[9]. This nucleus may remain intact through a variety of chemical changes, reacting as a unit. The number of groups which copper can bind co-ordinately is four, contrasted to six for chromium. In copper sulfate pentahydrate, selected for these experiments because it is the copper salt most familiar to the industry, four molecules of water are held by co-ordinate linkage to the central copper ion, and the whole is bi-positive[10]:



The fifth molecule of water is believed to be bound by the sulfate ion thus:



Other ions, radicles or molecules sometimes penetrate the copper nucleus by displacing one or more of the water groups.

When one considers the probable complexity of wool keratin structure, it seems likely even from this sketchy outline that the results of an examination of wool-copper reactions may not be easy to interpret unequivocally.

ROOM TEMPERATURE EXPERIMENTS

One set of swatches and baths was prepared as previously described[11]; the baths were M/50 with respect to $CuSO_4.5H_2O$, and contained varying amounts of sulfuric acid to give a range of pH values. Swatches for a second set were cut from the same fabric as the first, but were further extracted in Soxhlet extraction apparatus with petroleum ether and ethyl alcohol for six hours each, and finally with distilled water for two hours. Initial pH readings were obtained with a Coleman glass electrode pH meter before entering the cloth. The duration of the immersion period, which was carried out at room temperature, was about 64 hours, a period found to be adequate for the attainment of equilibrium in preliminary experiments. At the end of this time the swatches were removed, rinsed in running water for 1 hour, dried, weighed, and analyzed for copper content (see below). Equilibrium pH values were determined, and bath aliquots were first titrated with NaOH to the methyl orange end-point, then, after equalizing the volumes, further adjusted to pH 4.85* using the pH meter.

COPPER CONTENT OF THE SWATCHES

It was discovered in orientation experiments that copper is stripped from copper sulfate treated swatches in a strongly acid electrolytic bath, and quantitatively† deposited on a platinum cathode giving a simple (but time-consuming) method for determining the amount of copper present. The swatches were placed in a platinum crucible, which constituted part of the anode, and which in turn was immersed in a solution containing 5 ml. conc. HNO_3 and 10 ml. conc. H_2SO_4 in 250 ml. of water. A weighed platinum strip, bent to increase the surface exposed to the solution, was used for the cathode. Two dry-cell batteries (1.5 volts each) connected in series furnished the current (fig. 2). Cessation of deposition was approxi-

Figure 2. Apparatus for determining the copper content of copper sulfatte treated swatches.

mately indicated when hydrogen began to be given off strongly at the cathode, but the end-point was considered reached only when a few drops from the bath no longer formed a precipitate with freshly prepared H_2S saturated water. With an effective cathode area of 23-25cm.^{2}, and new batteries, approximately .03 gm. of copper was deposited in 18 hours. Most depositions were allowed to run overnight, and as much longer as the hydrogen sulfide test remained positive; but, in the case of smaller amounts of copper, continued immersion after completion of deposition may not have been wise. When the end-point was reached, the cathode was quickly removed and rinsed in running water, dipped in acetone, air-dried and weighed. The difference in weight was attributed to pure copper, and was expressed in terms of ml. M/10 copper solution per gram of wool. To clean the electrode, it was immersed in a solution containing 3 ml. conc. HNO_3, 10 ml. conc. H_2SO_4 and 25 ml. of water for a few seconds, rinsed, dipped in acetone and dried.

Data collected as described above appear in table 1.

A comparison of the results from the two sets of swatches shows that the additional cleansing operations in the second set did not lead to significant differences, and they were not repeated in succeeding experiments.

WOOL-COPPER SULFATE COMBINATION POSSIBILITIES

Several combining possibilties can be visualized in a wool-copper sulfate-sulfuric acid-water system. The usual wool-amino group — sulfate combination probably takes place. Also, from the fact that the copper content of swatches in equilibrium with copper sulfate baths of varying acidity increases with increasing pH (an effect graphically demonstrated by the gradual deepening of color of the swatches with decreasing acidity), it may be judged that the increasingly dissociated "free" carboxyl

TABLE 1. Data on Wool-Copper Sulfate-Sulfuric Acid-Water Relationships at Room Temperature

No.	Ml. N/10 H_2SO_4 used per 100 ml.	pH if acid were added to water	Initial pH in M/50 $CuSO_4.5H_2O$	Ml. N/10 H_2SO_4 found at equilibrium	Ml. N/10 H_2SO_4 lost from bath	Final pH	Ml. M/10 copper bound per gram of wool
1.	100	1.2	1.4	91.9	8.1	1.4	tr.
				92.4	7.6	1.45	
2.	76	1.3	1.5	67.9	8.1	1.55	tr.
				68.2	7.8	1.55	
3.	58	1.4	1.6	50.1	7.9	1.65	tr.
				50.1	7.9	1.65	
4.	45	1.5	1.7	37.3	7.7	1.8	<0.05
				37.2	7.8	1.75	
5.	34.5	1.6	1.8	26.7	7.8	1.9	<0.05
				26.7	7.8	1.9	
6.	26	1.7	1.9	18.3	7.7	2.05	<0.05
				18.2	7.8	2.0	
7.	20	1.8	2.0	12.4	7.6	2.2	<0.05
				12.6	7.4	2.25	
8.	15.5	1.9	2.1	8.4	7.1	2.35	0.06
				8.4	7.1	2.4	
9.	12	2.0	2.25	5.75	6.25	2.55	0.05
				5.35	6.65	2.55	
10.	9.2	2.1	2.35	3.05	6.15	2.8	0.10
				3.15	6.05	2.85	
11.	7.1	2.2	2.45	1.65	5.45	3.05	0.11
				2.25	4.85	3.05	
12.	5.6	2.3	2.55	1.0	4.6	3.3	0.20
				0.95	4.65	3.35	
13.	4.3	2.4	2.65	0.7	3.6	3.55	0.29
				0.8	3.5	3.55	
14.	3.4	2.5	2.75	0.5	2.9	3.75	0.40
				0.55	2.85	3.75	
15.	2.6	2.6	2.85	0.4	2.2	3.95	0.53
				0.4	2.2	3.95	
16.	1.65	2.8	3.05	0.35	1.3	4.2	0.74
				0.3	1.35	4.25	
17.	1.2	3.0	3.25	0.3	0.9	4.3	0.84
				0.25	0.95	4.35	
18.	0.6	3.5	3.65	0.2	0.4	4.5	1.07
				0.2	0.4	4.55	
19.	0.38	4.0	3.95	0.2	0.2	4.6	1.18
				0.2	0.2	4.6	
20.	0.0	(about 7)	5.1	0.1	+0.1	4.75	1.22
				0.1	+0.1	4.7	

* An arbitrary value selected because it was convenient at the time. Any other value between pH 4.5 and pH 5 would have done as well.

† The accuracy of the method was not exhaustively checked, but from such factors as the good reproducibility of results, freedom of the treated swatch from residual copper, and the superiority of the electrolytic method for copper determination in general when more than a trace is present, it was judged to be quantitative in order.

groups in wool constitute the determining factor in the binding of copper, which in this case is apparently totally cationic (only a trace of copper is detectable at pH 1.65 or less). These two conclusions obviously do not describe the system adequately. In order to reach a fuller understanding of the reactions involved, it is necessary not only to (1) trace the sulfuric acid combination as a function of pH, and (2) trace the copper combination as a function of pH; but to (3) trace any additional sulfate combination not detectable by the usual titration procedure, if possible (4) determine the manner in which this additional sulfate is bound, and finally from this data (5) propose a formula or formulas which seem to best represent the mode of combination of both copper and sulfate to wool.

The sulfate ion reacting with wool in the presence of copper most logically would be bound (1) by electro-valence to the "free" amino groups of wool, or (2) by electro-valence to copper (which in turn is bound by electro-valence to the "free" carboxyl groups of wool, and possibly by co-ordinate valence to other wool groups as well), or (3) by co-ordinate valence to copper (which again is bound by electro-valence and possibly co-ordinate valence to wool), or (4) some combination of these methods.

It may be possible to differentiate between sulfate bound by wool amino groups and that bound by wool carboxyl groups (through copper) by the comparative rate of hydrolysis of the two salts formed, if it is assumed that wool-amino-sulfate is the more readily hydrolysed. One reason for this assumption is that the pH of hydrolysing rinses (about 7) is such that little wool-amino-sulfate remains, while the wool-carboxyl-copper sulfate equilibrium may remain relatively unaffected. A more obvious reason is that the sulfate of wool-carboxyl-copper sulfate may be involved in a relatively irreversible complex formation.

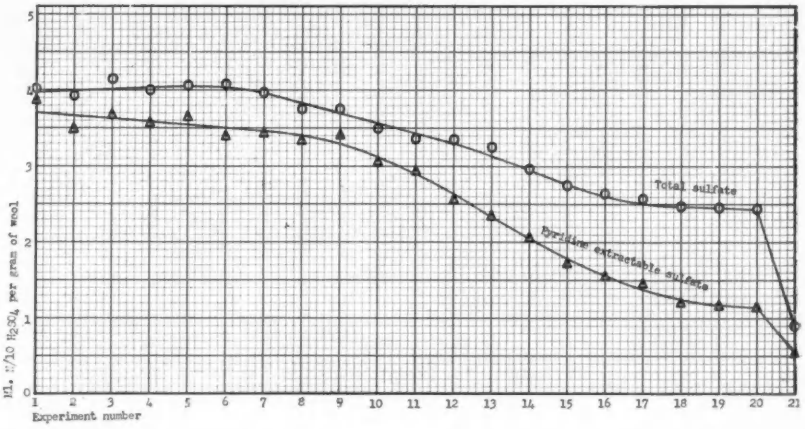
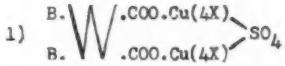
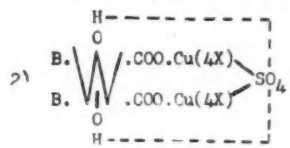


Figure 3. Total sulfate and pyridine-extractable sulfate if swatches treated with copper sulfate and sulfuric acid at room temperature are rinsed in running water for 1 hour.

To solve a similar problem involving sulfuric acid, a cationic chromium salt and leather, Gustavson[12] determined leather-amino-sulfate by steeping the treated leather in a bath kept slightly alkaline to methyl orange for 48 hours; then, rinsing to free from neutral sulfates, he analyzed the leather for total residual sulfate. To shorten the soaking period, he later tried a pyridine extraction[13], which seemed to remove all the sulfate from leather-amino-sulfate as sulfuric acid, as well as some of the sulfate from leather-carboxyl-chromium sulfate. Wilson[11], who has done considerable work on the problem, regards chrome leather as a labile system in which leather-amino-sulfate and leather-carboxyl-chromium sulfate are interrelated and interdependent with no determinable dividing line. This means that the concentration of one cannot be changed without effecting some re-distribution of the other, though this adjustment apparently does not take place immediately, and the new equilibrium ratio (amino- to carboxyl-sulfate) is probably different from the old.

Table 2 and figure 3 present data obtained by pyridine extraction[13], and total sulfate determination[10] on the rinsed swatches, and points to a possible solution to the mode of combination of the copper sulfate. From the table it can be seen that, as a lower limit, there appears to be slightly less than one relatively non-hydrolysable sulfate ion for every two copper atoms; and a relationship of 1 to 2, well within the suspected pyridine error, most simply corresponds to one of the following formulas*:

1) 

2) 

(10)

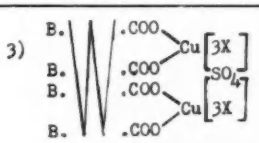
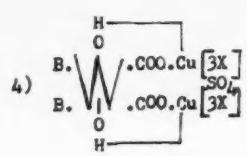
3) 

TABLE 2. Data on the Correlation of Pyridine Extractable Sulfate, Total Sulfate and Copper Content from Rinsed Copper Sulfate-Sulfuric Acid Treated Swatches which were brought to Equilibrium at Room Temperature

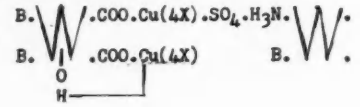
No.	*Pyridine extractable sulfate** Ml. N/10 H_2SO_4 per gram of wool	*Total sulfate* Ml. N/10 H_2SO_4 per gram of wool	*Difference (D)*	*Minimum wool-carboxyl-copper sulfate (D-0.37)*	*Ml. N/10 carboxyl-bound H_2SO_4 per gram of wool*	*Bound copper Ml. N/10 per gram of wool*
1.	3.88	4.01	0.13	—0.24	—0.12	tr.
2.	3.50	3.92	0.42	0.05	0.03	tr.
3.	3.68	4.14	0.46	0.09	0.05	tr.
4.	3.57	4.00	0.43	0.06	0.03	<0.05
5.	3.65	4.06	0.41	0.04	0.02	<0.05
6.	3.40	4.09	0.69	0.32	0.16	<0.05
7.	3.42	3.98	0.56	0.19	0.10	<0.05
8.	3.33	3.74	0.41	0.04	0.02	0.06
9.	3.41	3.75	0.34	—0.03	—0.02	0.05
10.	3.08	3.50	0.42	0.05	0.03	0.10
11.	2.93	3.37	0.44	0.07	0.04	0.11
12.	2.66	3.55	0.79	0.42	0.21	0.20
13.	2.34	3.26	0.92	0.55	0.28	0.29
14.	2.06	2.98	0.92	0.55	0.28	0.40
14.	1.72	2.75	1.03	0.66	0.33	0.53
16.	1.56	2.63	1.07	0.70	0.35	0.74
17.	1.45	2.58	1.13	0.76	0.38	0.84
18.	1.21	2.48	1.27	0.90	0.45	1.07
19.	1.18	2.45	1.27	0.90	0.45	1.18
20	1.14	2.42	1.28	0.91	0.46	1.22
21**.	0.53	0.90	0.37	—	—	—

* Supposedly wool-amino-sulfate.
** Swatch not treated with copper sulfate.

* Where W is the wool molecule core, B is $H_2N \rightleftarrows H_3N \rightleftarrows SO_3H_2N$ according to the pH of the solution, and X is a co-ordinately bound group other than sulfate, whether furnished by the wool or the solution. If the groups are wool groups, they are most likely to be nitrogen-containing or hydroxyl groups. The solid lines represent electro-valence bonds, the broken lines co-ordinate-valance bonds.



(17)



Intermediate structures could exist.* It also seems possible that the structures could change in a regular manner with changing pH.

It may be well to stress the point that these formulas can scarcely be regarded as more than highly speculative first guesses, and should not be labored too greatly pending the collection of further evidence.

Of the two simplest alternatives, it seems likely that copper is mono-positive rather than bi-positive with respect to the carboxyl groups of wool at room temperature.

TOTAL WOOL-AMINO-SULFATE

Neumayer[18] describes a method for obtaining the relative acidity of wool samples by steeping them in water for 10-12 hours, and obtaining the equilibrium pH. This method may be readily extended to give the actual acid content of the wool by reference to prepared curves. The present author has done enough work with re-equilibrium curves of sulfuric acid to indicate that the method has good possibilities over the middle range, and is a useful tool. The total wool-amino-sulfate content of wool treated with copper sulfate may be determinable with precision adequate for these preliminary experiments by this method, while it is not readily apparent how to do it as well otherwise.

Figure 4 illustrates the curves plotted from wool—sulfuric acid—water equilibrium data[11], from which the acid content of wool may be read once the equilibrium pH is known.

A brief description of the method follows.

Swatches at equilibrium with copper sulfate solutions of varying pH values were removed, wrung, and weighed in weighing bottles. From the difference between these weights and initial dry weights, and the equilibrium pH of the solution, the ml. of N/10 sulfuric acid in the liquor retained by the cloth were calculated. Though not strictly true, it was assumed in making these corrections that the acid content of the residual solution was the same as that of the bath†. The

(Continued on Page 395)

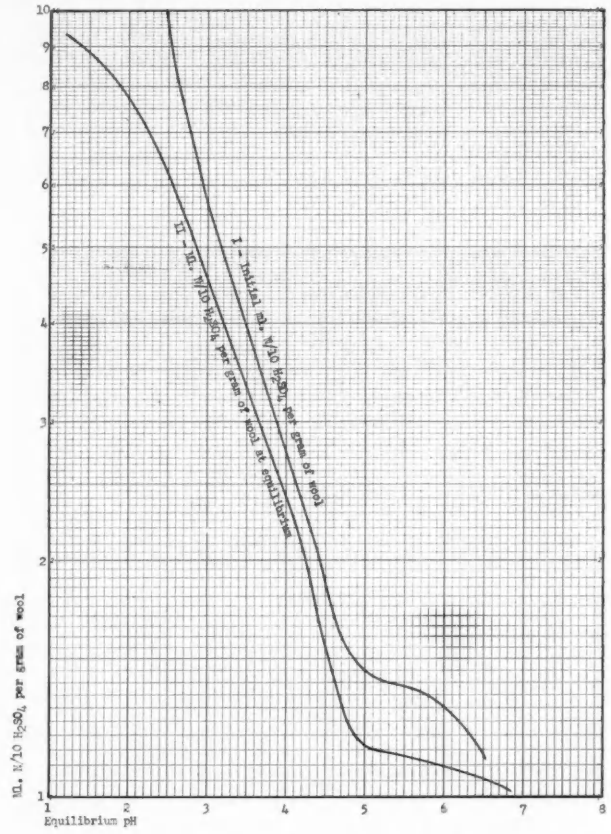

I – Initial ml. N/10 H_2SO_4 per gram of wool
II – ml. N/10 H_2SO_4 per gram of wool at equilibrium
Ml. N/10 H_2SO_4 per gram of wool
Equilibrium pH

Figure 4. Wool-sulfuric acid-water equilibrium curves (1/100 bath).

* It should not be overlooked that many references can be found in the literature attributing the reactivity of wool with complex-forming heavy metal ions to the di-sulfide (cystine) cross-linkage of wool keratin. The author thinks that the di-sulfide group is often involved, but that an electrovalent linkage to the wool carboxyl group is probably the determining factor in most combinations. This must remain a guess which is only partially substantiated until proposed experiments comparing untreated wool with wool in which the cystine cross-linkage has been modified[17a] have been completed.

† The error is negligible in most of the experiments which were run.

TABLE 3. Re-equilibrium Data on Swatches Treated with Copper Sulfate and Sulfuric Acid at Room Temperature

No.	*Final pH*	*Re-equilibrium pH*	*Total hydrolysable acid in system: Ml. N/10 H_2SO_4 per gram of wool**	*Ml. of original solution in swatch*	*Correction for solution retained by swatch*	*Corrected total*	*Minimum total sulfate expected in swatch after re-equilibrium***	*Total sulfate found*	*Differe*
3.	1.65	2.6	8.5	2.5	0.07	8.45	5.85	5.5	
9.	2.05	2.9	6.3	2.8	0.04	6.25	4.9	3.75	
12.	3.3	3.35	4.4	2.5	0.02		3.7	3.8	0.17
13.	3.55	3.55	3.85	2.6	0.01	3.85	3.2	3.49	0.29
14.	3.75	3.8	3.2	2.7	0.01	3.2	2.75	3.02	0.27
15.	3.95	4.0	2.8	2.7	0.01	2.8	2.4	2.59	0.19
16.	4.2	4.35	2.15	2.6	0.01	2.15	1.8	2.29	0.49
17.	4.4	4.55	1.8	2.8	0.01	1.8	1.5	2.39	0.88
18.	4.5	4.85	1.5	3.0	0.01	1.5	1.2	2.30	1.10
19.	4.6	4.9	1.5	2.8	0.01	1.5	1.2	2.36	1.16
20.	4.75	5.0	1.45	2.8	0.01	1.45	1.15	2.49	1.34

* Figure 4, curve I.
** Figure 4, curve II.

Proceedings of the
American Association of Textile Chemists and Colorists

AUGUST 12, 1946

Officers of the Association

WILLIAM D. APPEL, *President*
National Bureau of Standards, Washington, D. C.

HUGH CHRISTISON—HENRY F. HERRMANN, *Vice-Presidents*

WILLIAM R. MOORHOUSE, *Treasurer*
National Aniline Division, Allied Chemical & Dye Corp., Boston, Mass

HAROLD C. CHAPIN, *Secretary*
Lowell Textile Institute, Lowell, Mass.

LOUIS A. OLNEY
President Emeritus and Chairman of the Research Committee
Lowell Textile Institute, Lowell, Mass.

HAROLD W. STIEGLER
Director of Research
Lowell Textile Institute, Lowell, Mass

COUNCILORS
Representing Sections

HOWARD V. KING; ALLISON R. FLETCHER HAROLD B. STURTEVANT (Rhode Island)
JAMES P. CONAWAY; ARTHUR W. ETCHELLS, BOYCE C. BOND, PERCIVAL THEEL (Philadelphia)
PATRICK J. KENNEDY; ROY G. BUCK; LEONARD S. LITTLE; THOMAS F. O'BRIEN; GEORGE L. BAXTER; A. G. ASHCROFT (New York)
EDWARD S. CHAPIN; WALTER J. HAMBURGER; CHARLES H. A. SCHMITT (N. New England)
SIDNEY M. CONE; RAPHAEL E. RUPP; SAMUEL L. HAYES (Piedmont)
W. B. GRIFFIN (South Eastern)
MAX Y. PARKER (South Central)
HERBERT W. TETZLAFF; ARTHUR T. BRAINERD (Midwest)

Past Presidents

ELVIN H. KILLHEFFER; P. J. WOOD; ROBERT E. ROSE; WILLIAM H. CADY; ALBAN EAVENSON; CARL Z. DRAVES; THOMAS R. SMITH

Standing Committees of the Council and their Chairmen

Executive Committee on Research
Leonard S. Little, Chairman

Publicity
Winn W. Chase, Chairman

Appropriations
William R. Moorhouse, Chairman

Membership and Local Sections
Hugh Christison, Chairman

Publications
Louis A. Olney, Chairman

Corporate Memberships
Henry F. Herrmann, Chairman

Local Sections and Their Officers

Northern New England Section
George O. Linberg, Chairman, E. I. du Pont de Nemours & Co., Inc., 140 Federal St., Boston 10, Mass.
Azel W. Mack, Secretary, Dexter Chemical Corp., 581 Boylston St., Boston 16, Mass.
Frank J. Rizzo, Vice-Chairman; Martin H. Gurley, Jr., Treasurer

Rhode Island Section
George H. Wood, Jr., Chairman, 40 Valentine Circle, Apponaug, R. I.
James C. Shore, Secretary, 324 Weeden St., Pawtucket, R. I.
Robert W. Joerger, Vice-Chairman; Robert R. Farwell, Treasurer

New York Section
Dr. Herman E. Hager, Chairman, General Dyestuff Corp. 435 Hudson St., New York 14, N. Y.
Norman A. Johnson, Secretary, American Dyestuff Reporter One Madison Ave., New York 10, N. Y.
Charles W. Dorn, Vice-Chairman; John H. Hennessy, Treasurer

Philadelphia Section
Curt R. Baeringer, Chairman, 5936 Castor Ave., Philadelphia 24, Pa.
A. E. Raimo, Secretary, John Campbell & Co., S. E. Corner Broad and Spring Garden Sts., Philadelphia 23, Pa.
Walter F. Fancourt, Vice-Chairman; Arthur M. Gordon, Treasurer

Piedmont Section
Leland G. Atkins, Chairman, Southern Dyestuff Corp., Charlotte, N. C.
John B. Neely, Secretary, Burlington Mills, Yarn Dyeing Div., Burlington, N. C.
Wyss L. Barker, Vice-Chairman; Roy J. Beauregard, Treasurer

South Central Section
Clyde J. Horne, Chairman, Dixie Mercerizing Co., Chattanooga, Tenn.
Allan James Nelson, Secretary, Springfield Woolen Mills Co., Springfield, Tenn.
W. K. Newman, Vice-Chairman; Bernhard Borrmann, Treasurer

Midwest Section
Al. J. Feit, Chairman, E. I. duPont de Nemours & Co., Inc. 7 S. Dearborn Street, Chicago, Ill.
George B. Chabot, Jr., Secretary, Calco Chemical Division, American Cyanamid Co., 146 W. Kinzie Street, Chicago, Ill.
George E. Osha, Vice-Chairman; Joseph H. Jones, Treasurer

South-Eastern Section
A. Kempton Haynes, Chairman, Rohm & Haas Co., Inc., 1811 Meadowdale Ave., N. E., Atlanta, Ga.
Howard M. Waddle, Secretary, West Point Mfg. Co., Shawmut, Ala.
Matthew T. Barnhill, Vice-Chairman; Allyn J. Morse, Treasurer

STUDENT CHAPTERS

Lowell Textile Institute
North Carolina State College
Philadelphia Textile Institute
New Bedford Textile School

Members should notify the Secretary immediately of all address changes

Bleaching Textiles with Peroxides*

RUSSELL MILLS

Peroxygen Products Division, E. I. du Pont de Nemours & Co., Inc.

PEROXIDES have been used in textile bleaching processes for many years. When hydrogen peroxide was first discovered back in 1808 it was appropriately called "oxidized water." This is a very good descriptive name for hydrogen peroxides since when it decomposes it forms water and oxygen. In fact, "grass bleaching," the oldest bleaching method known, was actually a peroxide bleaching process. By this method the oxygen from the air in the presence of moisture was acted upon by the ultra-violet light to form minute quantities of hydrogen peroxide.

The action of peroxides in bleaching processes is essentially an oxidation reaction whereby the coloring matter is either destroyed or rendered water soluble.

While textile bleaching has been and still remains the primary use for peroxides, during the war the miliary forces found numerous new uses for this chemical and the supply for civilian industries was severely curtailed. Now that the war has been over for some time, peroxide is again available. One outstanding development that occurred during the war years was the manufacture of higher strength hydrogen peroxide. Some of the military uses called for strengths in the neighborhood of 85 percent or 395 volume concentration. Before the war, the accepted strength in the textile industry was 27.5 percent or 100 volume. We recently announced our ability to supply for general commercial use 130 volume peroxide which contains 35.0 percent hydrogen peroxide. This higher strength material has the same general handling characteristics as 100 volume, but requires less warehouse space for a given amount of actual peroxide. Should the need arise for a product of a strength higher than 35 per cent it can be manufactured and supplied.

In the textile industry, hydrogen peroxide, sodium peroxide and sodium perborate are used either alone or in various combinations to produce maximum efficiency and economy.

Presented at meeting, Mid-West Section, May 4, 1946.

The textile materials most frequently bleached are wool, cotton and rayon, or mixtures of these fibers. The development of nylon, Aralac and other synthetics of the protein type, and also the return of real silk to the market creates additional problems, and the selection of the chemicals and processes to be used is greatly dependent upon the exact composition of the yarn or fabric.

WOOL

Wool is bleached in various forms. There are three common classifications: raw stock, yarn and piece goods. In each of these three classifications the wool contains different amounts and different kinds of impurities. Wool raw stock contains natural impurities as well as dirt, burrs, etc. In the continuous bleaching of raw stock the actual bleaching is conducted in a bowl placed at the end of the wool scouring train. The wool enters the bowl from the last rinse and passes through a dilute, slightly acid solution of either hydrogen or sodium peroxide. Usually the train is so designed that the wool remains in the peroxide bowl for two-three minutes. At the exit end of the bowl it passes through squeeze rolls and is then dried without rinsing.

The bleach bowl must be lined with a material that will not be affected by or which will not catalyze the decomposition of the acidified peroxide solution. As a general rule lead-lined bleach bowls are used and the rakes are also covered with lead. Stainless steel bowls also are quite satisfactory.

Usually the wool enters the bleach bowl carrying some alkali from the scouring operations. It is, therefore, necessary to feed an acid, usually sulfuric, to neutralize the alkali and to maintain a pH of 3.5 to 5.5 in the bleach bath. Sometimes acid salts are used in place of sulfuric acid.

The amount of peroxide used in the bleach bowl will depend upon the degree of bleaching required. This concentration can range from 0.25 volume to 2.5 volume. In terms of 100 volume hydrogen peroxide, this would represent 1 to 10 quarts of 100 volume hydrogen peroxide per 10 gallons of water.

Wool yarn and wool hosiery is generally bleached by the use of the so-called standing baths. Previous to the bleaching operation the wool is well scoured by usual methods. The actual bleaching may be done in cypress wood, stainless steel, tile or transite vats. The vat should be fitted with a perforated or slatted false bottom placed about eight inches off the bottom and also with perforated or slatted grates to place on top of the yarn to keep it completely submerged during the bleaching operation. In the construction of wood grates and false bottom it is necessary that the wood be held together by materials which will not cause trouble in the bleach operation. Wooden pegs or stainless steel screws or bolts are satisfactory. Iron, copper or brass cannot be used. Some means must be provided to hold the top grate under the surface of the liquor.

A means of heating must be provided. This is accomplished by placing a close steam coil underneath the false bottom of the bleach vat. This coil may be of lead, stainless steel or aluminum, the choice being dependent upon the alkali to be used in the formula. Lead is not satisfactory if the formula does not contain silicates, or contains more than 50 per cent of the total alkali as pyrophosphate.

Bleaching is carried out by adding the chemicals, usually 2-3 lbs. of sodium silicate or 1½-2 lbs. of anhydrous sodium pyrophosphate, and 1 to 2 gallons of 10 volume hydrogen peroxide, to each 10 gallons of water in the vat, which has been previously heated to the desird temperature. The scoured yarn, which has been well rinsed and extracted, is added to the tank in a loose head. Hosiery may be entered either loose, or, if sizes are to be kept separate, in net bags or stainless steel baskets.

When the vat is loaded, a rack is placed in position so that all of the goods is submerged. The batch is allowed to bleach for five or more hours, frequently overnight, and then rinsed and dried.

Woolen piece goods may be bleached

by many procedures to fit the specific conditions of each mill. For the best white they may be submerged in a standing bath similar to that described for wool yarn bleaching. The desired shade may sometimes be obtained by bleaching in a reel machine for 2-3 hours at a temperature of 120-125°F. The quantity of peroxide used will depend upon the white desired. After the desired shade is obtained the peroxide solution should be pumped to a storage tank and replenished for subsequent bleaching operations. The bleached material may then be rinsed free of all chemicals and dried in the usual manner.

COTTON

Although wool bleaching is an important outlet for peroxides, the cotton bleaching field is much larger, and processes are more numerous and varied, as they must cover a wider range of requirements.

Cotton yarns and hosiery may be bleached in vats. The yarns can also be handled in stainless steel package machines; the hosiery in some types of dyeing equipment.

When bleaching in vats, the process is essentially the same as that previously described for wool, except that when all cotton materials are bleached, alkali and temperature may be increased. When cotton is in combinations with wool or synthetics, the wool method is used as previously described.

Bleaching cotton yarns in package machines is rapidly replacing older methods. There are many variations in formula possible, the following being only one of many which have worked out very successfully, in stainless steel equipment.

A typical method is to load the packages in the machine, add water to the proper level, and then add ½-2 percent of a good wetting agent, plus 2 per cent of soda ash and 4 per cent of silicate of soda. The liquor is circulated for about 20 minutes, during which time the temperature is raised to 120° F. Then 4 to 6 per cent of 100 volume hydrogen peroxide is added, based on the dry weight of the cotton, the temperature raised to 180° F., and the yarn bleached from 2-4 hours at this temperature. After bleaching, the yarn is thoroughly rinsed, and if desired, blued. The packages are then hydro-extracted and dried in a warm current of air.

KNIT GOODS

In the Mid-West, a great deal of the cotton bleached is in the form of tubular knit goods.

At present, there are two general methods for bleaching cotton knit goods with peroxides; namely, the kier and the open tub or slack washer.

The kier offers decided economic advantages over the tub or slack washer method, chiefly because chemical costs are lower due to the lower liquor ratio.

The kier bleaching process can be either a one or two step operation. The two-step method, which is gradually being replaced with the one-step method, consists of first scouring with a mild alkali, and then bleaching with an alkaline peroxide solution.

The one-step process combines these operations, and is preferred by many mills. In this process the rolls of knit goods are tied or sewed together and wet out through a standard slack washer. The slack washer usually contains warm water and the necessary amount of the desired "wetting agent." It is customary to wet out and load the kier simultaneously using either a kier piler or by piling manually. If manual piling is used it should be done from the top of the kier, not permitting the man to enter the kier.

After the kier has been filled, the peroxide bleach solution is added. After all the solution is added the pump is started and the cold bleach bath is circulated through the goods for 30 minutes. The steam is turned on and the temperature gradually raised to 180° F. over a period of 2-2½ hours. The bleaching is continued for 5-6 hours at 180° F. After the bleaching is finished, the kier is drained and filled with warm water and circulated for one hour. This is repeated and finally a cold wash is given. To satisfy local conditions this rinsing operation is sometimes modified considerably. In most cases the goods are pulled out of the kier through warm and cold washers. They are then squeezed or extracted and dried.

In the reel machine method the tub is loaded with about 60-100 lbs. goods per strand and sufficient water, generally about 800-900 gallons, is added per 1000 lb. load. I shall describe one method of many used for reel machines. For a total of 1,000 lbs. of goods about 50 lbs. hypochlorite (15 per cent available Cl_2) and 20 lbs. sodium silicate is added to the front of the machine while the cloth is running. The machine is run cold for about 15 minutes and then heated to 120° F. and allowed to run for 30 minutes. The charge is drained and a cold rinse is given

The machine is next filled with cold water and 30 lbs. of sodium peroxide added to the front while the cloth is running. After the sodium peroxide is all added, the cloth is run for 15 minutes cold and the temperature raised to 180° F. for one hour. Finally, the temperature is raised to 200° F. for 30 minutes. The machine is then drained and the goods washed, blued and dried in the usual manner.

CONTINUOUS BLEACHING

The new continuous bleaching process for cotton piece goods started commercially just before the war. It was perfected during the war years, and contributed materially to the production of fabrics badly needed by the government. This process has met with wide acceptance by the cotton piece goods industry, and 12 du Pont ranges are now operating, with many more on order.

Ten of these units are rope systems, with an average production of one million yards or the equivalent in pounds per week per complete unit. Two units are of the open-width type, which produce an average of 400,000 yards per week per unit, or about 200,000 lbs.

The continuous bleaching process is fundamentally a simple process. In the large piece goods bleacheries, it is generally considered as embodying two seperate phases. The first stage, a preparatory treatment, prepares the goods usually with caustic soda. The second stage is the bleaching process proper.

The conditions in the pretreatment step are adjusted to suit the needs of the cloth being processed. For instance, on white cottons the cloth is usually saturated with about 3 per cent caustic soda solution previous to passing through the heater tube. The cloth is allowed to remain in the J-Box in the heated condition for one hour after which it is pulled out and washed. The caustic treatment is used here for the same reason as in kier bleaching—to remove a large portion of the non-cellulose materials present in the cotton. If the goods in process contains vat colored yarns the pretreatment must be either a peroxide treatment or a special caustic-sodium-silicate step heated in an atmosphere of steam and air to keep the vat dyes oxidized while in the heated state in the J-Box.

In the pretreatment step, the motes, etc. are softened and the cloth is made quite receptive for bleaching. The degree of bleaching can be easily adjusted by varying the concentration of the hydrogen peroxide in the saturators.

In addition to the peroxide, it is necessary to have sodium silicate in the saturator. The role that sodium silicate plays is an important one. It exerts a stabilizing action upon the hydrogen peroxide. It inactivates catalytic impurities frequently present in plant waters, cloth, etc., and permits peroxide bleach baths of reasonable stability in the pH range where cotton is effectively bleached, thus permitting efficient bleaching at the lowest possible

(Concluded on Page P393)

The Colorimetry of Fluorescent Samples*

I. H. GODLOVE

General Aniline and Film Corp.

INTRODUCTION

I WAS invited to discuss the colorimetry of fluorescent samples. I shall discuss fluorescence, but the emphasis will be on colorimetry, to such a degree that the subject of my remarks might well have been: "the colorimetry of samples which happen to be fluorescent."

This report of the National Bureau of Standards workers†, initiated and financially supported by the Textile Color Card Association, is one of the milestones of modern colorimetry. It happened to bring into the foreground, as by-products of the research, the importance of standard angular conditions for colorimetry (discussed by Mr. Stearns†), and fluorescence. But an extremely important part of the work is the mere establishment of accurate colorimetric data on important colors used in the textile industry, especially the most saturated colors. Table V of the paper fits another page into the lexicon by which we can inter-translate the consumer's language of color and the producer's more precise but mysterious language of accurate physical measurement.

A third by-product of the Bureau's work is data on the ISCC-NBS descriptions of 238 sample colors, which enables us to get a far better picture of how successfully this system of color names works in practice. I shall discuss this by-product in connection with some statistical data.

One may add, incidentally, that the Bureau paper even gives data on a familiar psychological phenomenon of color. I refer to the mutual desaturating effect of contiguous colors of similar hue (as exemplified when viewing Munsell charts), and the inverse phenomenon, the increased saturations seen in neighboring samples of the TCCA standards arranged with contrasting hues in close proximity. We frequently hear that the Munsell standards are limited in use by insufficient colors of high chroma, whereas almost anyone would regard the beautiful TCCA silk standards as including many vivid or brilliant colors. As a matter of fact, the Bureau results show that only about one fourth of the TCCA samples exceeded in chroma the nearest Munsell sample, about one fifth required extrapolation of more than one chroma step, and only four had chromas greater than that (14) of the Munsell color of greatest saturation.

HISTORICAL

To see why I regard the Bureau paper as a milestone of technical colorimetry, one need only contrast the amount of accurate data available for colorimetry in the twenties of this century with that available today. There existed then the original Munsell "Atlas of Color," on which the Bureau had made fine measurements (1919 and 1926); the Ostwald standards, for which modern data were lacking; certain important assemblages of colors like the TCCA colors and those of the Maerz and Paul "Dictionary of Color." These collections were not arranged in the systematic way which so delights the scientist.

There existed then certain visual spectrophotometers and colorimeters like the Guild trichromatic colorimeter. The Bureau measurements on the Munsell colors were not published until 1940, while the Guild measurements, taken by several observers on the new Munsell standards, are even now still unpublished, because the specifications were calculated in terms of the old O.S.A. observer, and meanwhile the new international (1931 I.C.I.) standard observer and coordinate system had been adopted. There has been no one available to make the tedious recalculations on the new basis.

A great impetus was given to colorimetry in the late twenties when the Hardy spectrophotometer, rapid and accurate for most purposes, became generally available. A second great boost was given by the 1931 I.C.I. definitions of standard observer and standard viewing and illuminating conditions; and a third by the extremely stimulating discussions, beginning in 1933, which resulted in the 1943-4 report of the Colorimetry Committee of the Optical Society of America, not yet completed.

But so late as 1939, no exact data existed for inter-translation of the various systems of color standards, and in fact no data expressed in the new terms. At that time I persuaded Prof. Hardy to arrange for two of his students to make measurements on the Munsell standards. This resulted in the well-known 1940 paper of Glenn and Killian. Meanwhile, by cooperation of the O.S.A. and the ISCC, a committee headed by Prof. Newhall reviewed the spacing of the Munsell standards and in 1943 made its final report. These two organizations are responsible for many other papers on the Munsell system, culminating in a group published in the Journal of the O.S.A. in July 1943. Just a year later in the same journal and under the same auspices were published four papers on the Ostwald color system. These included data on the Color Harmony Index and Manual published by the Container Corporation of America and based on Ostwald's ideas.

In 1933, a report by a committee of which I was chairman, became the basis of the ISCC-NBS system of color names. About 1938, Dr. Judd and Mr. Kelly took over this work and introduced some revisions which I had lacked the courage to apply. Neither in my reports nor in the corresponding definitions of common color names, like appleblossom pink, which I wrote for Webster's New International Dictionary, did I go the whole way in making the descriptions completely serve the dictionary function of merely recording current usage. I did not dream that scientists were willing to *follow completely the layman*, then crystallize the layman's usages by scientific reference to the Munsell system. My "light" and "dark" had *the same* Munsell value in all hues. The Bureau improvement was the sliding scale of values which the man in the street uses, high for yellows, low for blues and purples.

Some persons had the feeling that the ISCC-NBS descriptions were a rival for the Maerz & Paul, Ostwald, Munsell and TCCA designations (and, I might add,

---

* Paper read at Discussion Session, on May 6, 1946, co-sponsored by the Textile Color Card Association of the U. S., Inc., and the American Association of Textile Chemists and Colorists at the 15th Annual Meeting, Inter-Society Color Council. Also see other papers July 1st issue.

† See July 1, 1946 issue.

the Webster definitions.) I did *not* think so. Each has its usefulness for particular purposes; each its advantages and disadvantages. In the case of the TCCA colors, I believe that the names like seashell pink, jungle green and Old Glory Blue represent romance; *and romance will never die.* The important thing was to correlate the systems, inter-translate them. Realizing this, Mrs. Rorke put Mrs. Reimann, my right hand at the Munsell Laboratory in the twenties (Mrs. Bellamy, the Company's present manager, was my left hand) to measuring the TCCA colors in the fundamental terms expressible in the "1931 I.C.I." system and Munsell notations. This would make them conform to the provisions of the American War Standard Z 44-1942 for the specification and description of color.

We now have I.C.I., Munsell and ISCC-NBS specifications on the Munsell and TCCA colors, and I.C.I. and Munsell specifications on the Ostwald colors (in the Jacobson-Foss form). These all supplement rather than rival each other. Likewise, as early as 1932, I got Munsell notations for all the important M & P colors, as a step toward the Webster definitions; and for many of them there are independent determinations by Mrs. Reimann and others. One or two other steps of this general nature remain to be taken.

Fortunately also, I had on hand the record which I made in May 1945 of determinations by me of the Munsell notations of 112 TCCA silk colors. These and some statistical data, including data on prevalence of fluorescence, may serve as a means of throwing light on the Reimann-Judd-Keegan paper.

INDEPENDENT MUNSELL NOTATIONS OF TCCA COLORS

In 1945 I compared 112 colors of the standard TCCA card, illuminated by two Macbeth daylight lamps at 45° and viewed normally, with Munsell charts. I have averaged the differences in hue, value and chroma between my results and the "estimated book notations" determined by Mrs. Reimann. In the case of hue, since hue discriminability varies with chroma, I first corrected to a standard chroma of six. The results are separated into those for strongly fluorescence colors and for the others:

Differences in Munsell Notations

	H	V	C
Average (Reimann — Godlove), strongly fluorescent colors	1.32	.21	.81
Average (Reimann — Godlove), other colors	.69	.22	.62
"Uncertainty" (G.B.R.)	.67	.20	.50

It may be seen, first, that I differed from Mrs. Reimann on the weakly and non-fluorescent colors, by an amount closely comparable to her own uncertainty; but I differed considerably more in the chromaticity of the strongly fluorescent samples. It must be remembered that she used north skylight while I used Macbeth daylight; also that I used different samples and an old copy of the Munsell charts. However, the effect of fluorescence in causing difficulty in one determination or the other is clearly evident.

We may next compare my results with the final adopted Munsell notations. The differences were in all cases greater than the average differences between the paper's book notations and adopted notations (0.50, 0.10 and 0.40). The results were:

Differences in Munsell Notations

	H	V	C
Average ("Adopted" — Godlove), strongly fluorescent colors	1.22	.21	1.05
Ditto, other colors	.64	.22	.61

Again the same difference between strongly fluorescent and weakly plus non-fluorescent colors is evident. Incidently, the small size of the differences, considering the different light sources and the age of the TCCA and Munsell standards I used, is very reassuring when considering the use of Munsell determinations. I have frequently found my own "uncertainty" in determining Munsell notations directly about the same as G.B.R.'s published one in value and chroma, but definitely smaller than 0.67 hue step. On the other hand, my experimental determinations for ten observers, including myself, found 0.2 value step on the average equal to about 0.8 chroma step and 2.2 hue step. Hence my own hue uncertainty is not in good agreement either with G.B.R.'s or my other nine observers'; and it may possibly be attributed to my very great experience in this determination. So early as 1934, I published data showing that similar uncertainties were obtained by direct comparisons on certain flat colors and by use of Munsell determinations obtained indirectly through spectrophotometry and graphs of Guild colorimeter data on Munsell colors.

DATA BEARING ON THE ISCC-NBS COLOR NAMES

In 1932 I examined the possibility of using TCCA and M & P common color names to name the 600 portions into which we had then divided the color solid for the ISCC names which later became the ISCC-NBS names. By means of various criteria, I selected the 600 "commonest common names." But I found, what I had feared, that even though we go out from the highways into the by-ways to get "common" names, *common names existed for only one third of the 600 pockets or groups of colors.* There existed no common names for the remaining two-thirds.

We were forced, therefore, to give up the use of "common names," like sky blue, to name the 600 groups of colors. For if we had to invent names for two-thirds of the colors, we might as well invent names for all, at the same time being systematic about it. Using both a "textile cherry," taken from the TCCA colors, and a "paint cherry red," taken from M & P, and other similar pairs in the few cases where the two authorities failed to agree, gave few additional names, so helped little. It may be added that this situation has improved very little with the Bureau revisions, even when cutting down to the use of only 312 pockets in the color solid over which to distribute the names.

In this connection I made a survey based on the 238 names in the Table V of the Reimann-Judd-Keegan paper, and on an additional 274 M & P colors. I hoped thereby to throw light on both the ISCC-NBS and the common names.

First, I found that the average length of the 238 ISCC-NBS names was 2.7 words per name, these words being practically all mono- or di-syllabic. Only two required five words because of "borderline" Munsell notations, and only 19 required four words. Therefore the names are sufficiently short.

For the 512 systematic equivalents of the TCCA and M & P common names, the distribution of modifiers, like "pale" or "strong" is fairly satisfactory; e.g., "moderate" is used in 25 per cent of the names, "weak" and "strong" together in 26 per cent. The remaining 49 per cent are distributed fairly evenly over the chroma-value ranges, except for two noticeable exceptions. In the six classes described by beginning with the word "very," fall only 6 per cent of all the colors, while in the "brilliant" class are only 0.5 per cent of the colors. Many of the TCCA colors seem brilliant to me. There are no colors at all described as "very brilliant," "very light," or "very deep." These lacks seem to me to suggest some changes in the ISCC-NBS names. (The description of cherry as a "moderate" color is apparently a typographical error.)

In respect to hue distribution, slightly more than half of the common names are in the red-orange-brown range. slightly

less than one quarter in the blue-purple-red-purple range, over 18 per cent in the yellow--olive-green range, and about 8 per cent nearly neutral. Thus concentration occurs not only in some chroma-value ranges but in certain hue ranges. This is reflected in the fact that for the present 312 ISCC-NBS color groups, common names exist for only 183, or 58.6 per cent.

FLUORESCENCE

The NBS observations, combined with some of my own, lead to a striking anomaly. Although I have been searching for many years for fluorescent dyes, fluorescing with fair quantum efficiency, I have succeeded in finding very few. Of over 1,400 dyes listed in the Colour Index of the (British) Society of Dyers and Colorists, not more than 85 are characterized as fluorescent. But the Bureau states that, of the 238 TCCA standards, more than half are fluorescent, of which 55 are strongly fluorescent. *This apparent contradiction needs explanation.*

The Bureau gives one explanation which is no doubt true, at least in part. It is suggested that dyers have learned how to take advantage of fluorescence to increase the "brightness" of dyeings. Here I am using "brightness" as the dyer uses it, to embrace both lightness and saturation.

I think, however, that another cause of exceptional prevalence of fluorescence in the TCCA silk-standard dyes may be operating. This effect may arise, in a way to be explained, by the desire to use dyes of high saturation and tinctorial strength. To understand the connection, it is necessary to consider both the nature of color, as determined by selective light absorption, and fluorescence.

Colored substances absorb light selectively because of the presence of coordinatively unsaturated "chromophore" groups of atoms. Deep colors are obtained when there are also present in the molecule "auxochrome" groups, such as the amino group, which introduce the possibility of "resonance" between forms of the molecule which make up a "resonance hybrid." These differ from one another only by the positions of shifted electron-pairs. Absorption is increased when the molecules are in an "ionoid" condition; but the most important chromophore is the double-bonded carbon atom, whose effect is multiplied greatly when present in chains with alternate double and single bonds ("conjugate chains"). The typical dyes contain auxochrome groups, electron-rich groups which act as electron-donors, and chromophore groups, which are electron acceptors. Thus there is present a tendency for electron transfer; and the conjugate chain serves as the path over which the resonating electron can move. This resonance is most complete when, because of symmetry, the extreme forms which the molecule can assume are equivalent and of the same energy content; and when this is true the color is deepest.

Increased depth is also favored by the presence of formal electrical charges (ionoid forms); and by increased density of atomic groupings, as when the atoms in the molecule form rings. The bending of the bonds away from their normal valence directions introduces strain; and the greater this strain, the more the electrons are freed from their constraints. In the typical dyes, the strain is considerable, and the electrons have such mobility that they may be considered to form a diffuse cloud. The strain favors the ionoid forms; and absorption of light is itself due to alternations of phase between the ionoid forms.

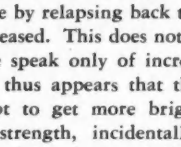
When light is absorbed, the molecule reaches a state of higher energy, and is said to be "excited." The effect of resonance is to lower the energy more in the excited state than in the normal state. According to quantum mechanics, the state of increased mobility of electrons and separation of charges corresponds to absorption at longer wave-lengths. G. N. Lewis and Calvin in 1939 discussed the restrictions under which the resonance must operate to obtain the deepest color in dyes.

High electron mobility *may* lead, but does not necessarily lead, to fluorescence, for the following reasons. Fluorescence is simply the return of a molecule from an excited state to one of lower energy, with emission of energy. Every substance is theoretically capable of emitting the light it absorbs, that is, of fluorescing. But ordinarily, the efficiency of the process is too low to be observed; or the fluorescent light is in the ultra violet or infra-red, to which our eyes are not sensitive. Ordinarily, there is greater probability of other processes dissipating the extra absorbed energy—by chemical reaction, or by collisional or other processes, ending finally in convertion to heat.

All organic molecules, including dyes, which show strong fluorescence, have fully conjugated bond systems. In these structures, the electronic excitation energy must not be easily transformed to heat, due to some sort of shielding of the electrons. J. Weiss (1940) and Franck and Livingston (1941) stated the conditions for fluorescence. From these conditions intense fluorescence may be expected from symmetrical, conjugated ring systems, which are just the ones yielding deepest colors.

It is easy to see that if at any time there is statistically a large proportion of mobile electrons in excited levels, the *chance* for fluorescense by relapsing back toward normal is increased. This does not necessarily follow; we speak only of increased probability. It thus appears that the dyer, in the attempt to get more brightness and tinctorial strength, incidentally succeeds also in obtaining increased fluorescence.

Three of the most intensely fluorescing dye groups all have the structure:



where A is CH or N and B is O or NH. These include the azines, the xanthenes and the acridines. The thiazole group also contains a closed-ring structure, which favors fluorescence because of the increased strain in the molecule. (J. Stark and R. Meyer, 1907). The same situation is also found in the indanthrene vat dyes, and in aromatic hydrocarbons with condensed benzene rings (anthracene, fluorene, retene, naphthacene, chrysene, pyrene, rubrene, benzopyrene, perylene, and pyranthrene); and in some heterocyclic rings (coumerin, umbelliferone, carbazol, quinoline and quinine).

In general, strong auxochrome and salt-forming groups not only intensify the color but increase fluorescence. On the other hand, halogens (especially I), NO_2, NO and phenyl groups not part of a condensed-ring structure, decrease fluorescence Lewis & Calvin's theory gives a very satisfying explanation, but this will not be discussed by me. (See Lewis and Calvin's "loose bolt" hypothesis.)

DEFINITIONS AND SUMMARY

(1) Fluorescent dyes, though not too numerous or efficient, are here to stay. We need them not only because they are tinctorially strong apart from fluorescence, but also because they give brighter colors by fluorescence itself.

(2) But the effect of fluorescence on the colorimetry of the dyed silk standards raises many interesting questions of definition. Most important of these is: exactly *what do we mean by the daylight color of a fluorescent sample?* Do we mean the color when the sample is illuminated by daylight? If so, we may have to distinguish a "July-daylight-color" from a "December-daylight color." Perhaps a daylight through-glass color from a daylight not-through-glass color; for the relative proportion of ultra-violet light in daylight, or at least in sunlight, varies from morning to noon, and varies greatly from July to December. Other questions of definition are also raised by this paper and will occur to you.

(3) The importance of separating strongly fluorescent samples from other samples is emphasized by these new results. The Munsell standards are very convenient for this check on other materials (note their use by Gibson and Keegan, reference 5 of the paper), that prove to be only slightly fluorescent; and they provide a way of measuring the colors of those that prove to be strongly fluorescent and on that account not open to reliable analysis by the spectrophotometer.

I shall close my discussion by congratulating the authors on a very interesting paper and Mrs. Margaret Hayden Rorke and her associates for initiation and financial support of a fine public-spirited and useful project; and by thanking her and Dr. Judd for suggestions for revision of my discussion. The authors have at two or three points touched on the great value to industry, as well as to colorimetry, of the TCCA standards and these measurements. I need dwell no further, therefore, on these valuable services.

—♦ ♦—

Peroxides—

(Concluded from Page P389)

cost. Where equipment other than stainless steel is used, such as iron kiers, the sodium silicate forms protective coatings over the metal surfaces and inhibits corrosion.

The continuous bleaching process is currently being used to bleach sheetings, print cloths, twills, colored yarn shirtings, etc. There are two variations of the process. In a majority of cases the rope system is used because cloth is handled easiest in rope form and high operating speeds can be obtained. However, when heavy goods are bleached before dyeing, care must be taken to prevent crease marks, etc., and for this work the open-width equipment is used. In both systems, the sequence of operations is the same; the difference merely being in the method of handling the cloth.

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information through the code numbers from the Secretary.

46-5

Education: Lowell Textile School, Night, Chemistry, 1942.
Experience: Hosiery dyeing and finishing.
Age 29; married; references.

46-6

Education: Graduate, Lowell Textile Institute, B.T.C., 1942.
Experience: Recently Lieut., U.S.N.R., and Commanding Officer.
Age 27; single.

46-7

Education: Graduate, Bradford Durfee Textile School, 1933.
Experience: Five years as Textile Engineer, developing Non-woven fabrics.
Age 31; married; 3 dependents; references.

46-9

Education: Graduate, Philadelphia Textile Inst., Chem. & Dye.
Experience: Inspector, Quartermaster Corps. Staff Sgt., U.S.A.A.F., Sta. Chief, Meteorology.
Age 24; married; references.

46-10

Education: B. S., Pratt Inst.
Experience: Leather finishing. U. S. Army Medical Corps, Pharmacist, C. W. S. Instructor. Lab. application work on textile chemical specialties. Development of colors in laboratory and pilot plant. Interested in tech. sales service.
Age 31; single.

46-11

Education: PhD. Chem. Engg., Geneva, Switzerland.
Experience: Chief Chemist of Textile Mills, silk and cotton.
Age 57; single; references.

46-12

Education: Graduate New Bedford Textile School, 1945.
Experience: Laboratory technician, chemical, and physical testing.
Woman, age 20, single: references. Employment near Atlanta, Ga., preferred.

CALENDAR OF COMING EVENTS

SOUTH CENTRAL SECTION:
Meeting (Tentative): September 21
(Patton Hotel, Chattanooga, Tenn.)

SUB-COMMITTEES
Meetings: September 26
(Hotel Commodore, New York City)

COUNCIL:
Meeting: September 27
(Hotel Commodore, New York City)

RESEARCH COMMITTEE:
Meeting: September 27
(Hotel Commodore, New York City)

NEW YORK SECTION:
Meetings: October 11, November 22
(Downtown Athletic Club, New York City)

PIEDMONT SECTION
Meeting: October 26
(Charlotte, N. C.)

NATIONAL CONVENTION:
Silver Jubilee Convention: December 12, 13 and 14.
(Hotel Statler, Boston, Mass.)

OUTING, NEW YORK SECTION

THE annual outing and golf tournament of the New York Section was held on Friday, June 21st, at the North Jersey Country Club, with an attendance of about 250.

Emmett Driscoll, retiring chairman, presided at the dinner in the evening and asked for a rising vote of thanks for the outing committee and also for Dr. Harman E. Hager, chairman-elect, for his work in conjunction with the exhibits at the national convention and his various efforts on behalf of the New York Section.

In the absence of Charles W. Dorn, the prizes were awarded by R. Timothy Gibson and Paul J. Luck. It was announced that due to the cup having been won by Paul A. Dunkel three times it had been retired and that a new cup would be placed in competition next year by the American Dyestuff Reporter. Prizes in golf were awarded as follows:

Low Gross—Paul A. Dunkel—73.

Second Low Gross—Sidney Orcutt and Robert Brewer—tie at 75.

Kickers Handicap—Prizes won by the following with a net of 79—F. J. Holt, C. L. Kloss, A. M. Weiner, C. J. Rahm, Hugo Todebusch, H. Epstein, Mr. Seback, and R. Williams.

High Score—A special prize was awarded to Paul Duggan for a high score of 177.

Horseshoes—Prizes were awarded in horseshoe pitching to H. P. London, Herbert Stauderman, and Mr. Boaglion.

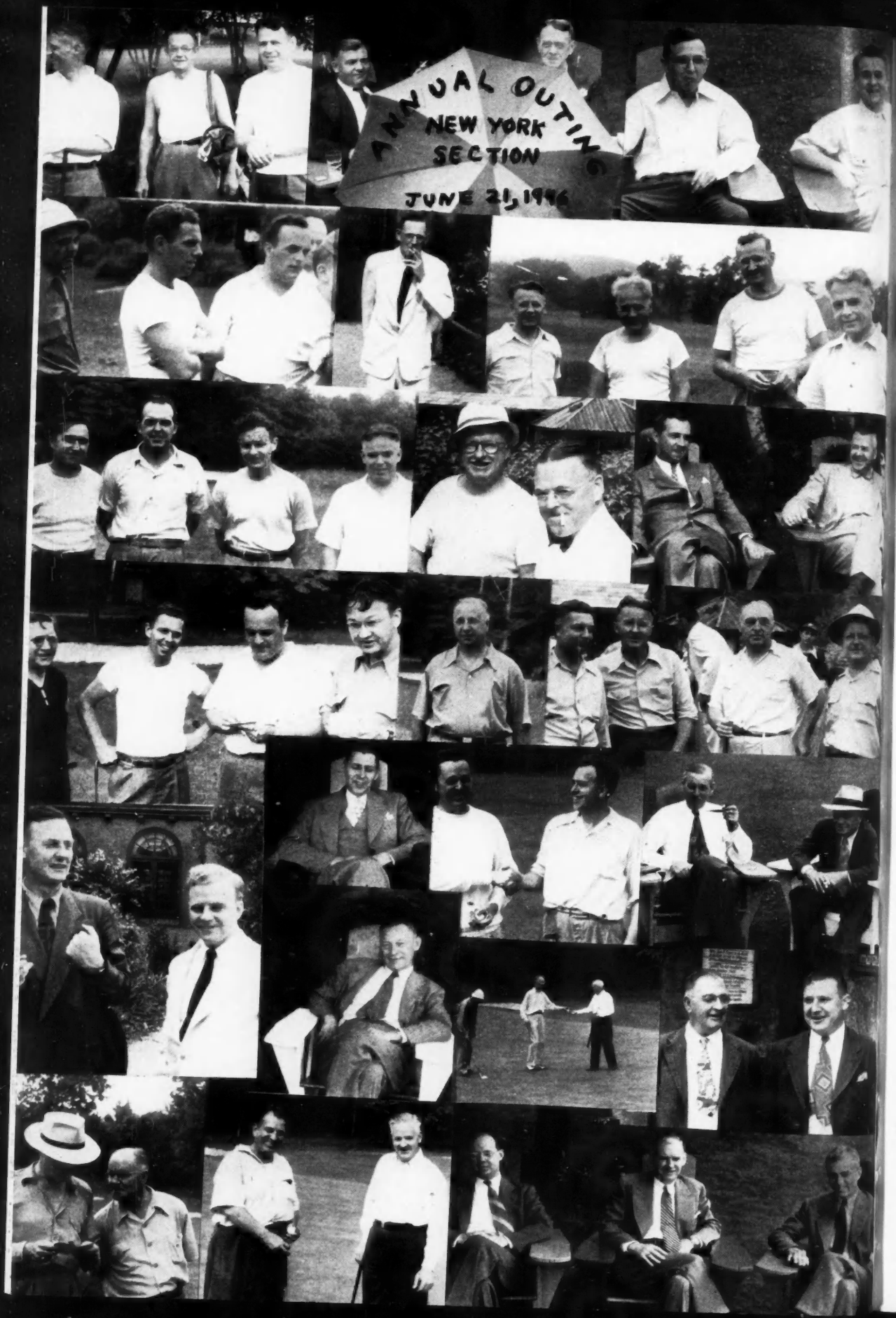
In addition, a number of attendance prizes were awarded.

Following dinner a floor show was presented.

The committee in charge of the outing consisted of the following: R. Timothy Gibson, chairman; Hugo Todebusch, golf; John H. Hennessey, prizes; Paul J. Luck, finance; Robert Holoch, horseshoe pitching; Winn W. Chase, press; Dr. Herman E. Hager, dinner; and Charles W. Dorn, prize awards.

Respectfully submitted,
NORMAN A. JOHNSON,
Secretary

(Photos on following page)


ANNUAL OUTING
NEW YORK
SECTION
JUNE 21, 1946

Combination of Wool Protein with Heavy Metal Salts as a Function of pH

(Continued from Page 386)

swatches were then placed in 1/100 baths of water at room temperature and allowed to come to equilibrium overnight. From the pH of the equilibrium bath and the curves of figure 4, the wool-amino-sulfate was read as sulfuric acid, and the above correction was then applied.

Data are given in table 3.

Figure 5 illustrates the wool-amino-sulfate and wool-carboxyl (through copper) sulfate titration curves plotted from the data of tables 1, 2 and 3.

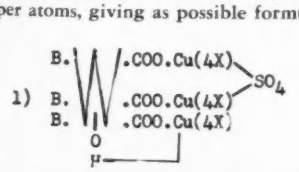
WOOL-COPPER SULFATE-SULFURIC ACID-WATER RELATIONSHIPS AT THE BOIL

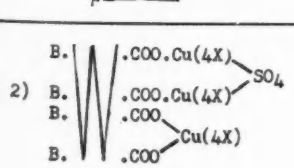
The experiments described above were repeated with swatches which were brought to equilibrium with copper sulfate solutions of varying pH values by boiling under reflux condensers for 1 hour. All pH readings (table 4) were taken at room temperature, and are therefore not truly representative of equilibrium conditions at the boil. Some sort of correction may be applied by extrapolating temperature-pH data beyond the 50°C. to which most tables read, but the validity of this approach is hard to appraise.

The boiled M/50 solution of $CuSO_4.5H_2O$, cooled to room temperature, has a pH of about 3.6, probably due to the precipitation of a basic copper salt (which can be seen on the bottom of the flask), with a consequent readjustment of the hydrolysis equilibrium.

Data appear in tables 4, 5 and 6, and are plotted in figures 6 and 7.

From table 5 it can be seen that there apepars to be about one relatively non-hydrolysable sulfate ion for every three copper atoms, giving as possible formulas:





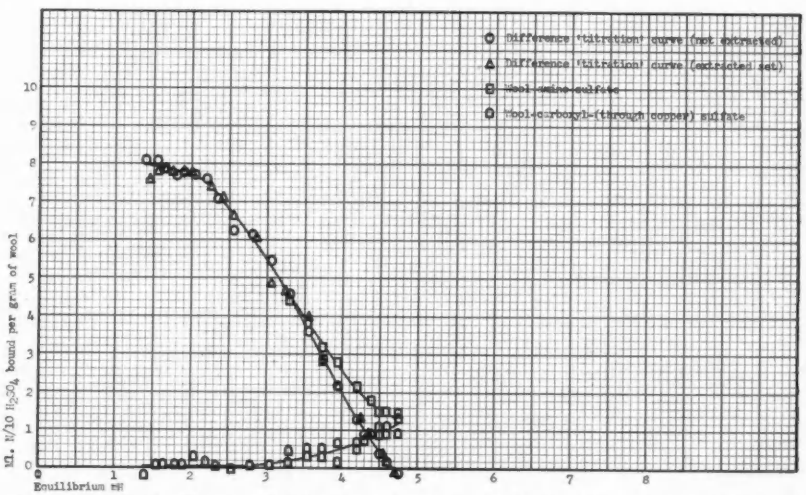

Difference titrational curve (not extracted)
Difference titrational curve (extracted set)
Wool-amino-sulfate
Wool-carboxyl-(through copper) sulfate
Ml. N/10 H2SO4 bound per gram of wool
Equilibrium pH

Figure 5. Wool-sulfate combination as a function of pH at room temperature in baths M/50 with respect to copper sulfate and acidified with sulfuric acid.

TABLE 4. Data on Wool-Copper Sulfate-Sulfuric Acid-Water Relationships at the Boil

No.	Ml. N/10 H_2SO_4 used per 100 ml.	pH if acid were added to water	Initial pH in M/50 $CuSO_4.5H_2O$	Ml. N/10 H_2SO_4 found at equilibrium	Ml. N/10 H_2SO_4 lost from bath	Final pH	Ml. M/10 copper bound per gram of wool
1.	100	1.2	1.4	91.5	8.5	1.3	
2.	76	1.3	1.5	67.6	8.4	1.45	
3.	58	1.4	1.6	49.7	8.3	1.6	
4.	45	1.5	1.7	37.0	8.0	1.7	
5.	34.5	1.6	1.8	26.8	7.7	1.8	0.04
6.	26	1.7	1.9	18.3	7.7	2.0	0.28
7.	20	1.8	2.0	13.35	6.65	2.15	0.43
8.	15.5	1.9	2.1	9.35	6.15	2.3	0.56
9.	12	2.0	2.25	6.6	5.4	2.45	0.70
10.	9.2	2.1	2.35	4.55	4.65	2.6	0.84
11.	7.1	2.2	2.45	3.5	3.6	2.75	1.16
12.	5.6	2.3	2.55	2.1	3.5	2.9	1.30
13.	4.3	2.4	2.65	2.05	2.25	3.0	1.53
14.	3.4	2.5	2.75	1.75	1.65	3.1	1.73
15.	2.6	2.6	2.85	1.45	1.15	3.15	1.78
16.	1.65	2.8	3.05	1.06	0.6	3.2	1.87
17.	1.2	3.0	3.25	1.0	0.2	3.25	1.85
18.	0.6	3.5	3.65	0.8	+0.2	3.3	2.03
19.	0.38	4.0	3.95	0.65	+0.25	3.4	2.12
20.	0	(about 7)	5.1	0.2	+0.2	3.6	2.23

The sulfate may be bound more firmly than indicated by additional hydrogen bonds from wool hydroxyl groups (see formula 2 in the first group).

The contrast between the re-equilibrium pHs of tables 3 and 6 (compared respectively to initial equilibrium pHs) indicates that the two sets of experiments are not wholly analogous, and the conclusions drawn from the data are therefore not only tentative but somewhat uncertain.

A comparison of the color of the swatches treated in M/50 copper sulfate, one at room temperature the other at the boil, may be seen in the spectrophotometric curves R and B of figure 8. The room temperature swatch is blue-green, the boiled swatch greenish-yellow; the latter was even yellower when first taken from the bath and dried.

TABLE 5. Data on the Correlation of Pyridine Extractable Sulfate, Total Sulfate and Copper Content from Rinsed Copper Sulfate-Sulfuric Acid Treated Swatches which were brought to Equilibrium at the Boil

No.	Pyridine extractable sulfate* Ml. N/10 H_2SO_4 per gram of wool	Total sulfate Ml. N/10 H_2SO_4 per gram of wool	Difference (D)	Minimum wool-carboxyl-copper sulfate (D-0.37)	Ml. M/10 carboxyl-bound H_2SO_4 per gram of wool	Bound copper Ml. M/10 per gram of wool
1.	3.29	3.54	0.25	0.00	0.00	
2.	3.34	3.48	0.14	—0.11	—0.06	
3.	3.25	3.42	0.17	—0.08	—0.04	
4.	3.24	3.73	0.49	0.24	0.12	
5.	3.37	3.72	0.35	0.10	0.05	0.04
6.	3.18	3.76	0.58	0.33	0.17	0.28
7.	3.36	4.19	0.83	0.58	0.29	0.43
8.	3.45	3.70	0.25	0.00	0.00	0.56
9.	3.31	4.10	0.79	0.54	0.27	0.70
10.	3.24	3.89	0.75	0.50	0.25	0.84
11.	3.05	3.95	0.90	0.65	0.33	1.16
12.	3.00	3.91	0.91	0.66	0.33	1.30
13.	2.81	3.90	1.09	0.84	0.42	1.53
14.	2.65	4.08	1.33	1.08	0.54	1.73
15.	2.47	3.84	1.37	1.12	0.56	1.73
16.	2.45	3.91	1.46	1.21	0.61	1.87
17.	2.33	3.78	1.45	1.20	0.60	1.85
18.	2.44	3.89	1.45	1.20	0.60	2.03
19.	2.34	4.20	1.86	1.61	0.81	2.12
20.	2.24	3.99	1.75	1.50	0.75	2.23
21**.	0.49	0.74	0.25	—	—	—

* Supposedly wool-amino-sulfate.
** Swatch not treated with copper sulfate.

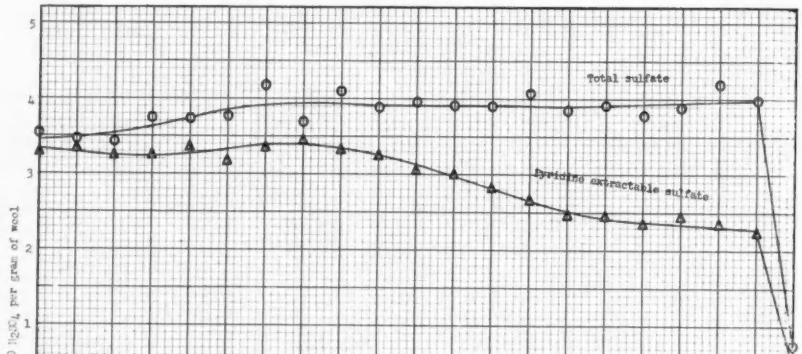


Figure 6. Total sulfate and pyridine-extractable sulfate of swatches treated with copper sulfate and sulfuric acid at the boil and rinsed in running water for 1 hour.

COMBINATION AT pH VALUES HIGHER THAN 4.45

Due to hydrolysis of copper sulfate in solution, the pH of a M/50 solution at room temperature is about 4.85, and 100 ml. at equili rium with 1 gram of wool has a pH of about 4.45. At this pH the effective dissociation of wool as an acid is probably low[6], and a method which will allow combination of copper and wool at higher pH values is highly desirable. Addition of NaOH precipitates copper hydroxide with little change in the pH of the bath until an equivalent amount is reached, so this approach is of no value. Two methods suggest themselves as means of obtaining slightly higher pHs: 1) use of a more dilute solution of copper sulfate (being careful to keep a sufficient excess of the salt over dissociated wool groups); 2) use of a salt which hydrolyses less, e.g. copper acetate. M/200 copper sulfate has a pH of about 5.45, but 100 ml. of this solution at equilibrium with 1 gram of wool has a pH of about 4.85, a disappointingly small gain. In addition, although there is approximately 2½ times as much copper present as is needed to satisfy the acid wool groups dissociated at this pH, less copper is found in the swatch than is bound at pH 4.45 from M/50 copper sulfate. Copper acetate (a M/50 solution has a pH of about 5.45, a wool equilibrium pH of about 5.3; a M/10 solution corresponding values of 5.6 and 5.35) probably does not give strictly comparable results, because of the effect of the different anion on the equilibrium. The ml. of M/10 bound copper found were respectively 2.38 and 2.39.

A more promising method is to form tetramine copper sulfate by adding the equivalent amount of NH_4OH; a series of experiments may then be run by using progressively more NH_4OH to the highest pH wool will stand without prohibitive decompositions*. This approach seems sound, but it leaves a gap between pH 4.45 and (about) 8.8†, and introduces the uncertainty of correlation of curves obtained with an acid having a common ion and those obtained with an alkali, in addition to changing the nature of the complex ion.

Data are given in table 7.

Figure 8 shows a spectrophotometric curve (T) of a treated swatch (table 7, No. 13) for comparison with curves R and B. The color of swatch T is a dark, blackish green.

* Selecting such a point is an arbitrary procedure at best, since "prohibitive decomposition" can have no meaning but a relative one, which will vary with the purpose in mind. A limiting (initial) pH value of 11 was chosen.

† Solutions having a pH below 8.8 contain a precipitate, and results from them would have doubtful significance.

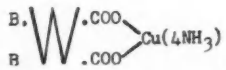
TABLE 6. Re-equilibrium Data on Swatches Treated with Copper Sulfate and Sulfuric Acid at the Boil

No.	Final pH	Re-equilibrium pH	Total hydrolysable acid in system; Ml. N/10 H_2SO_4 per gram of wool*	Ml. of original solution in swatch	Correction for solution retained by swatch	Corrected total	Minimum total sulfate expected in swatch after re-equilibrium**	Total sulfate found	Difference
3.	1.6	2.7	7.6	2.0	0.07	7.55	5.5	5.5	0.0
11.	2.75	3.4	4.25	2.1	0.01	4.25	3.55	3.64	0.09
12.	2.9	3.5	3.95	2.0	0.01	3.95	3.35	3.61	0.26
13.	3.0	3.65	3.55	2.1	0.01	3.55	3.0	3.52	0.52
14.	3.1	3.8	3.2	1.9	0.01	3.2	2.75	3.3	0.55
15.	3.15	3.95	2.9	2.5	0.01	2.9	2.5	3.11	0.61
16.	3.2	4.05	2.7	1.9	0.01	2.7	2.35	3.0	0.65
17.	3.25	4.15	2.5	1.7	0.01	2.5	2.2	3.07	0.87
18.	3.3	4.3	2.2	1.8	0.01	2.2	1.9	2.95	1.05
19.	3.4	4.35	2.15	1.8	0.01	2.15	1.8	3.45	1.65
20.	3.6	4.45	2.0	1.6	0.01	2.0	1.6	3.66	2.06

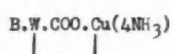
* Figure 4, curve I.
** Figure 4, curve II.

Pyridine extraction and total sulfate tests on the tetramine copper sulfate swatches seem to indicate that the sulfate ion is not bound by the carboxyl groups of wool (through copper) in this case. The following formulas might thus be expected:

1)



2)



Since bi-positive copper with respect to carboxyl groups would give values which seem prohibitively high for wool-copper combination, it is assumed that copper is mono positive in this case too.

Figure 9 illustrates the combination of wool with copper as a function of pH as tentatively interpreted in this paper.

CONCLUSION

Because of the frequent occurrence of poor agreement of results on the sulfate of wool-carboxyl-copper sulfate**, none of the experimental data seems sufficiently reliable to serve as an unqualified basis for establishing the method of combination to wool; but the number of repetitions of sulfate determinations (in some cases a half-dozen) seems to justify reliance upon the trend which the average figures indicate. Rather than continued repetition, it seems more promising at this stage to examine the behaviour of wool toward other heavy metals analogous to copper (particularly chromium) with the hope that a fresh attack may help to clarify the problem.

** In addition to some results which were definitely anomalous.

REFERENCES

[1] J. Steinhardt, M. Harris, Am. Dyestuff Reptr. 29, 5 (1940); 29, 6 (1940); and same authors with C. Fugitt, 29, 23 (1940).
[2] J. Steinhardt, C. Fugitt, M. Harris, Am. Dyestuff Reptr. 30, 9 (1941); 30, 10 (1941); 31, 4, (1942).
[3] J. Steinhardt, C. Fugitt, M. Harris, Textile Colorist, 65, 769 (1943).
[4] J. Speakman, E. Stott, Trans. Faraday Soc. 30, 539-48 (1934).
[5] H. Neville, C. Jeanson, Am. Dyestuff Reptr. 22, 21 (1933).
[6] K. LaFleur, Am. Dyestuff Reptr. 34, 21 (1945).
[7] A. Werner, New Ideas on Inorganic Chemistry, Eng. trans. E. Hedley, Longmans, Green, N. Y. (1911).
[8] R. Schwarz, La Chimie des Complexes Inorganiques, Fr. trans. A. Julliard, Dunod Paris (1922).
[9] G. Lewis, Valence and Structure of Atoms and Molecules, Chem. Cat. Co. (1923).
[10] H. Emeleus, J. Anderson, Modern Aspects of Inorganic Chemistry, p. 159, Routledge & Sons, London (1945).
[11] K. LaFleur, Am. Dyestuff Reptr. 34, 23 (1945).
[12] K. Gustavson, J. Am. Leather Chem. Assoc. 21, 559 (1926).
[13] K. Gustavson, Ibid. 22, 60 (1927)
[14] J. Wilson, Chemistry of Leather Manufacture, Vol. 2, p. 679, Chem. Cat. Co., N. Y. (1929).

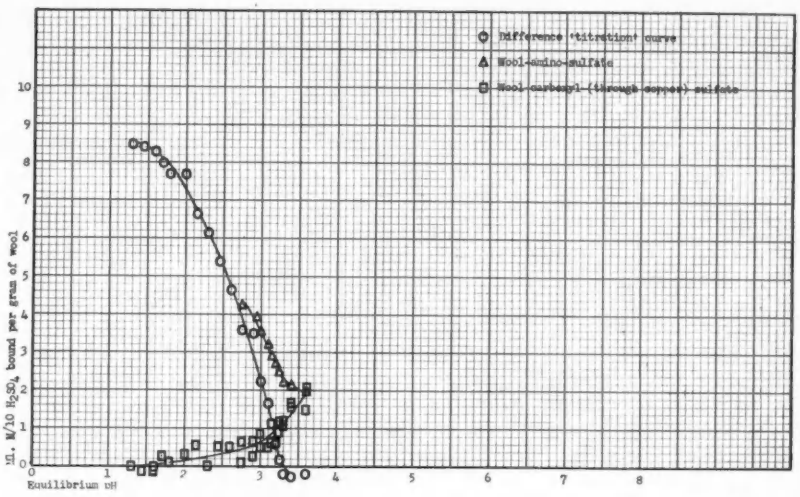


Figure 7. Wool-sulfate combination as a function of pH at the boil in baths M/50 with respect to copper sulfate and acidified with sulfuric acid.

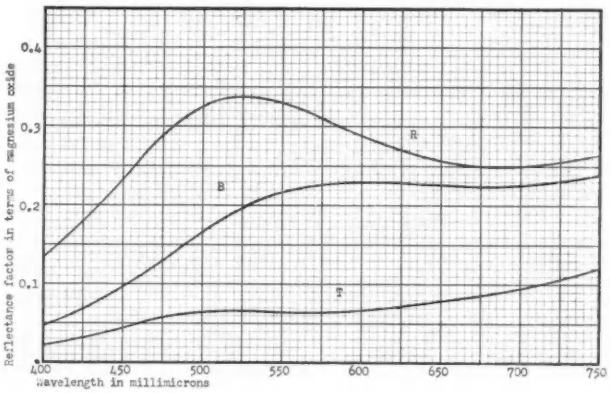


Figure 8. Spectrophotometric curves of swatches treated with copper sulfate. R = room temperature; B = boil; T = tetramine copper sulfate at room temperature.

TABLE 7. Data on Wool-Copper Sulfate-Ammonium Hydroxide-Water Relationships

No.	Ml. N/1 NH_4OH used per 100 ml.	pH if base were added to water*	Initial pH when added to M/50 copper sulfate	Equilibrium pH	Ml. M/10 copper per gram of wool	Total sulfate in rinsed swatches
1.	0	(about 7)	5.1	4.75	1.22	2.42
2.	13	11.18	9.0	8.85	3.58	1.12
3.	14	11.2	9.2	9.05	4.88	
4.	21	11.29	9.55	9.35	6.33	1.31
5.	24	11.32	9.65	9.45	6.24	
6.	27	11.35	9.8	9.6	7.42	
7.	31	11.37	9.95	9.8	8.43	1.40
8.	40	11.43	10.2	9.95	8.87	
9.	46	11.46	10.3	10.05	8.80	
10.	50	11.48	10.4	10.1	8.31	1.11
11.	56	11.50	10.5	10.2	7.96	
12.	70	11.55	10.65	10.35	7.67	
13.	83	11.59	10.75	10.45	7.32	1.30
14.	98	11.62	10.85	10.55	7.59	
15.	112	11.65	10.95	10.6	7.25	
16.	126	11.67	11.0	10.7	7.12	1.42
17.	140	11.7	11.05	10.7	7.25	
18.	150	11.72	11.05	10.75	7.05	1.76

* Read from a dissociation curve plotted from data compiled by Wilson[10].

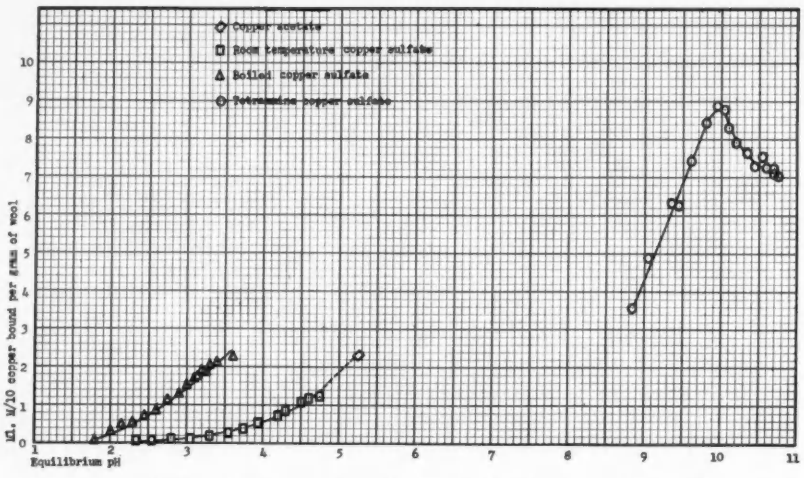


Figure 9. Combination of copper from a M/50 solution of copper sulfate with wool as a function of pH.

[15] J. Barritt, J. Text. Inst. 26, T87-92 (1935).
[16] R. Mease, J. Research NBS 13, 617-23, RP 731 (1934).
[17] C. Schmidt, Chemistry of Amino Acids and Proteins, Chap. 13, p. 746, et seq. Charles Thomas, Springfield, Ill. (1944).
[17a] W. Geiger, F. Kobayashi, M. Harris, Am. Dyestuff Reptr. 32, 5 (1943).
[18] K. Neumayer, Melliand Textilber. 21, 1E (1940).
[19] J. Wilson, op. cit. Vol. 1, p. 121.

PATENT DIGEST

PAUL WENGRAF

TALL OIL TREAMENT E, 1

U. S. Patent 2,396,471 (Hercules Powder Company—Osterhof—March 12, 1946).

Tall oil is obtained in paper pulp manufacture in the cellulose refining operation. It is extracted from the raw cellulose pulp by a fresh lye ("white liquor") and the spent liquor, resulting in this digestion is known under the name of "black liquor." This "black liquor" contains crude alkali salts of fatty acids and resin acids ("tall oil soaps") having a dark appearance and an unpleasant odor. The fatty and resin acids are separated from this soap by acidifying. It is particularly interesting to purify the fatty acids. The boiling points of these acid groups are very close so that separating by distillation is not satisfactory. The present invention consists of subjecting tall oil to a heat treatment in the presence of sulfo acids (example: toluene sulfonic acid) whereby the fatty acids remain unchanged while the resin acids are converted into decarboxylated products like abietanes. By a further alkali treatment the fatty acids form soaps. The resin products are present in an emulsion of these soaps and can be separated by a solvent extraction. This method seems to be very important for preparing soaps from a relatively cheap and easily available material.

Earlier work done on this subject: U. S. Patent 2,389,284 (Colgate Palmolive) describes refining of tall oil by a hydrogenation process, using a Ni-catalyst at temperatures between 50—135° C.—U. S. Patent 2,388,412 (Chemical Foundation) recommends a treatment with liquidified propane or a similar hydrocarbon at a very low temperature. The fatty acids are miscible under these conditions with the liquid hydro carbons while rosin acids are insoluble. Another separation is disclosed by U. S. Patent 2,352,547 (Pittsburgh Plate Glass Co.): Tall oil is dissolved in polyethylene glycol ether which principally dissolves the fatty acids. A selective adsorption by activated carbon is described in Ind. and Eng. Chemistry Ind. Ed. May 1944 p. 430 by Papps and Othmer.

PIGMENT PRINTING METHOD (ZEIN DISPERSION) D. 2, 07

U. S. Patent 2,396,430 (Interchemical Corporation—Massarene—March 12, 1946)

Pigmented compositions are prepared from prolamines such as zein—a maize protein which has the property to be soluble in dilute (aqueous) alcohol. Former attempts to use zein in water paints and pigmented inks have been unsuccessful because of the poor stability of the composition in storage. A stable pigment dispersion according to the present invention can be prepared by mixing a pigment such as Prussian Blue, Chrome Yellow or the like in a dough mixer with zein, a detergent forming acid and urea. The expression "detergent forming acid" is intended to cover every fatty or resinous acid but the inventor found tall oil (compare the foregoing abstract) most appropriate for this purpose. Urea is added as a plasticizing agent. The well mixed mass disperses easily in dilute aqueous ammonia. Probably these pigment emulsions can be used for printing textiles although the patent specification does not mention any special method of application.

Some references to earlier work, done on this subject:

Zein has been proposed for sizing, adhesive and fiber forming purposes. See U. S. Patent 2,392,084 (Evans): Dispersions in alcohol are stabilized by an addition of formaldehyde. Water resistant adhesives containing heavy metal salts added to zein dispersions: U. S. Patent 2,364,792 (Corn Prod. Ref.). Zein can also be used for preparaing protein fibers: the unstable solutions are stabilized by adding Carbondisulfide—see U. S. Patent 2,380,429 (Eastman Kodak). A comprehensive survey, regarding this matter can be found in Ind. and Eng. Chemistry, Ind. Ed. 1941, p. 394, Swallen.

CREASE RESISTANT FINISH FROM QUATERNARY COMPOUNDS G, 2, 04

U. S. Patent 2,397,451 (Am. Cyanamid Company—West—March 26, 1946)

Resin pre-condensate solutions, generally used for rendering textiles crease-proof are not sufficiently stable in use as finishing agents as disclosed in the present patent. It is proposed to prepare instead aqueous solutions of resin forming bodies from which insoluble resins are precipitated in a heat curing process. Urea and formaldehyde are condensed, transformed thereby in dimethylolurea and etherified by methanol or another lower alcohol. These ethers are treated thereafter with higher alcohols and the thus obtained higher and lower ethers are transformed by methods, known by themselves for instance by pyridinium compounds — into water — soluble quaternary ammonium compounds. Textiles impregnated with a 5 per cent solution of these substances were cured and the insoluble resin precipitated by decomposition at temperatures between 260—270° F. A fabric having excellent crease-resistance is obtained.

DELUSTERING NYLON FABRICS F, 3, 02

Brit. Patent 574,785 (Imp. Chem. Industries—Hardacre—January 21, 1946)

Solutions of metallic inorganic salts such as lithium, calcium, or zinc chlorides, bromides or nitrates are adapted for producing locally delustered effects on nylon. These salts are applied from alcoholic solutions which are preferably thickened by an alcohol-soluble rosin. An example is a printing paste, made from colophony and alcohol, calcium-chloride and ethanol. The printed fabric is dried and washed with alcohol to remove the rosin. Gum senegal acts as a resist so that lustrous prints on a delustered ground can be obtained by pre-printing gum senegal and passing the fabric through a non-thickened alcoholic calcium chloride solution.

DELUSTERED PRINTS ON NYLON D, 2, 07

(Cross Reference)

Brit. Patent 574,785 (Imp. Chem. Ind.—Hardacre)—See group F 3, 02

NEW PRODUCTS • TRADE NOTES

• BOOKLET ON SYNTHETIC ORGANIC CHEMICALS

A new 12-page booklet, "Physical Properties of Synthetic Organic Chemicals," has just been issued by Carbide and Carbon Chemicals Corporation, a Unit of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Data on the physical properties, and applications for more than 175 synthetic organic chemicals are presented in tabular form for ready and easy reference. This booklet has been designed as a condensed guide for research chemists, laboratory technicians, and purchasing agents. Copies can be obtained without charge by writing to the Company. Your copy will arrive more quickly if you mention "Form 6136."

• HOUGHTO-WAX

To meet a demand in sizing cotton warps for additional smoothness, better fiber lay, easier weaving and increased strength without loss of elasticity, E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia, announces a product designated as "Houghto-Wax."

It is not a replacement of any ingredient formerly used in sizing but its use to some extent is said to permit a lower concentration of starch. Houghto-Wax is added to the regular size formula in the amount of about 3 pounds to 100 pounds of starch. Size Check-Up Tests which have been made in mills are said to indicate a stronger warp without decreasing elongation when Houghto-Wax is added to the size formula. This product is supplied in one-pound cakes, packed 100 to a case, convenient to use without the necessity of weighing.

• MELLIN CHEMICALS

Nelson F. Mellin, formerly associated with the Electrochemicals Department, E. I. duPont de Nemours & Co., Inc., has announced the establishment of Mellin Chemicals, Inc., 582 Broad Street, Glen Rock, New Jersey. The phone number is Ridgewood 6-3048. The new company will handle a quality line of chemical products.

• MOTHPROOFING IN EUROPE

A report on mothproofing of woolen materials in Europe which, it is expected, will be ready for distribution in September, is being published by Textile Research Institute, Inc., 10 East 40th Street, New York 16, N. Y. This report includes papers by Dr. M. L. Crossley on the chemical structure and method of application of the principal type of mothproofing compound in use in Europe and by Werner von Bergen on the status of mothproofing in Germany and England. Both were members of an investigation team which visited Europe under the direction of Technical Industrial Intelligence Corps. Copies of the report will be $1.50 each.

• ONYX EXPANSION

Onyx Oil & Chemical Company, Inc., Jersey City 2, N. J., is expanding its production facilities through the acquisition of a plant at St. Charles, Staten Island.

The new plant is located on 8 acres of land owned by Onyx, and has its own water supply and dock facilities. Production schedules have been set up for manufacturing resin emulsions, quaternaries and alkyl naphthas. This is to be extended to include larger volumes of other products now being made at the Jersey City plant.

• TYLOSE HBR

A comprehensive account of German manufacture and use of the soap-saving detergent "Tylose HBR" is contained in a report now on sale by the Office of Technical Services, Department of Commerce. The report was made by Lester F. Hoyt for the U. S. Army Quartermaster Corps in Germany for the benefit of Army laundries.

The major use of Tylose HBR in Germany was to improve the washing qualities of synthetic detergents, particularly for cotton cloth. It is said to be harmless to fibers and to laundering equipment, to give a better handle to the washed fabrics, to prevent an ash content from building up after repeated washings, and to inhibit the development of "tattle-tale-gray."

The German manufacturers also claimed that the washing action of soap was improved by the addition of Tylose HBR, and that the amount of soap used could be reduced to the extent of two and one-half to three times the weight of Tylose HBR used. They consider Tylose HBR the key to the use of synthetic detergents in household and commercial laundering.

The investigators recommend further study and testing of the product by the Office of the Quartermaster General and by American producers of soap and synthetic detergents.

The report (PB-3865; photostat, $5; microfilm, $1; 64 pages) gives a detailed account of the production of Tylose HBR, including a flow diagram. It also discusses the theory and application of the product and describes other cellulose derivatives similar to Tylose. A trade bulletin published by the Kalle plant on the use of Tylose for the production of soap powder is included as an appendix.

Two other reports on Tylose HBR have previously been released by OTS. PB-14527 (photostat, $2; microfilm, 50 cents; 19 pages) describes the production of cellulose ethers in Germany including Tylose HBR. PB-8007 (photostat, $1; microfilm, 50 cents; 19 pages) describes the production of Tylose HBR at the I. G. Farben plant at Wiesbaden.

Orders for the reports should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

• EXPORT DISTRIBUTION FOR HERCULES

William L. Cahall, newly appointed sales manager of the Export Department of Hercules Powder Company, will fly to Honolulu August 15 on the first leg of an eight month trip to the Hawaiian Islands, China, the British Crown colony of Hong Kong, the Philippines, Netherlands East Indies, Singapore, India, and the Union of South Africa.

While abroad, he will re-establish distribution outlets for Hercules products, visit company customers, determine potential outlets for Hercules products, and appoint distributors for some of the company's newer products, especially toxic agents for insecticides and synthetic resins, which were not exported extensively in pre-war days.

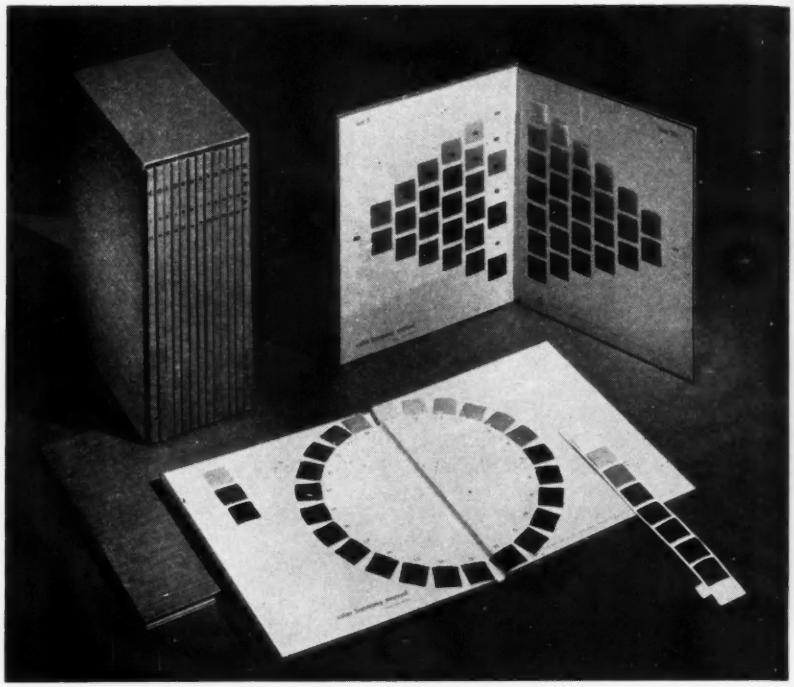
• COLOR HARMONY MANUAL

The publication of a Large Clip Edition of the Color Harmony Manual has been announced by Color Laboratories Division, Container Corporation of America, 111 West Washington St., Chicago, Ill. In this, the individual color chips are one inch square plus a tab, providing two and one-half times more working area than the chips in the first, 1942 edition. Among the obvious advantages of the larger working area of the chips are the increased speed with which a visual impression of a color is gained, and the ease with which color matching is accomplished. Also, the necessarily larger charts (11" x 18¾" when open) are more appropriate for teaching and for presenting color schemes before groups of people.

The shape of each chip provides a tab on which is printed the complete Ostwald notation for that color. All chips are removable from their positions which are marked accordingly for easy return. The location of any Ostwald notation is evident from a glance at the transparent flyleaf which is printed with all letter notations. The chips in both editions of the Manual are identical in color. Thus, the colorimetric specifications for the dull sides of all 680 chips which were published in the July 1944 issue of the Journal of the Optical Society of America apply equally well to both editions.

A new feature of the Large Chip Edition is a work chart in which chips may be arranged for study in circular or linear series. Also included is a twenty-four page text which has been revised from the original text where more exact wording seemed appropriate. It explains the basic Ostwald principles of color order in nontechnical language, and tells how to use them to obtain harmony in color.

The National Bureau of Standards in a recent publication stated that. . . "The Manual is designed, as the name implies, chiefly to promote the knowledge and study of color harmony. Because of the fact, however, that there is a shiny and a dull side to the chips both of which are easily available for comparison with unknown colors, the Manual is exceptionally well suited to serve also as a set of color standards for general use, and it has already achieved considerable acceptance for this purpose."



Hedrick-Blessing Studio

The Large Chip Edition of the Color Harmony Manual consists of 12 handbooks containing 600 movable color chips, a work chart, a removable gray scale holder, a 24 page illustrated text and a buckram covered box. Illustrated in the background is the complete set and a typical handbook. The work chart (foreground) allows the arrangement of circular or linear series of chips. The gray scale chip holder shown may be fastened in any handbook.

• JOINS MONSANTO TEXTILE RESEARCH

Monsanto Chemical Company has announced the appointment of Dr. Ralph Nickerson, authority on cellulose, to the textile research department of its Merrimac Division at Everett, Mass.

Author of a number of papers on the physical and chemical properties of cellulose, Dr. Nickerson will take part in a Monsanto research program on textile fibers and fabrics.

Dr. Nickerson was formerly associated with the Firestone Tire & Rubber Co., Ecusta Edwards Paper Co., Ludlow Manufacturing Sales Co., and with the Mellon Institute as a senior research fellow.

Dr. Nickerson joins Dr. Oscar Cohen, recently appointed to the department.

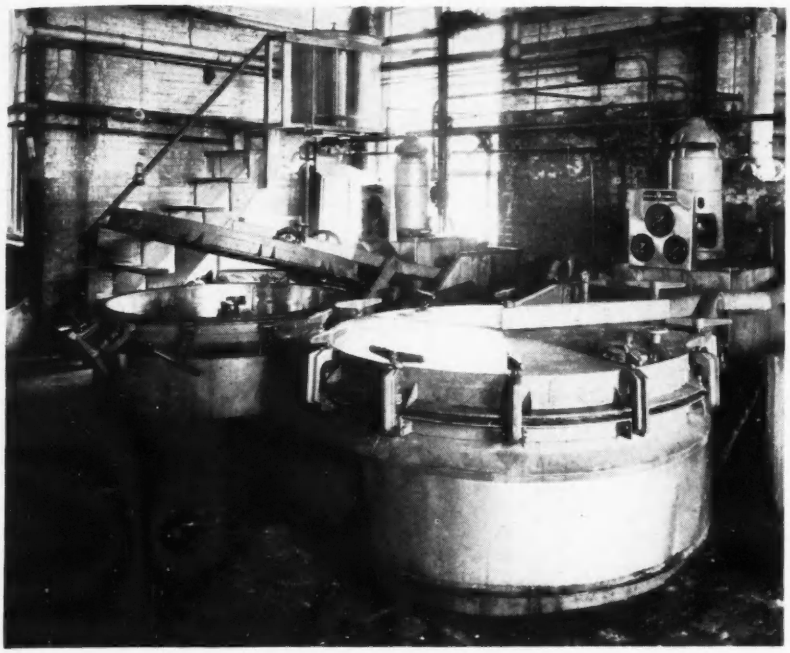
• OFFICER, S.C.I.

Cyril S. Kimball, Vice-President of Foster D. Snell, Inc., was elected on July 12th by the Council in London as the American Vice-President of the Society of the Chemical Industry.

• INDICATORS ADDED TO STOCK DYE KETTLE

Riggs & Lombard, Inc. of Lowell, Mass., have recently adopted temperature, pressure and depth indicators as standard equipment on their Stainless Steel Stock Dyeing Machine.

With the aid of these indicators The Fleet Line Machine puts stock dyeing on an even more scientific basis than in the past. The temperature indicator makes it possible to maintain the exact tempera-



Recent installation of Fleet Line Stock Dye Kettles, showing temperature, pressure and depth indicators, tilting covers, and gravity feeding of dye liquor to kettles.

Closeup of panel board, showing temperature, pressure and depth indicators.

ture throughout the operation. The pressure indicator discloses faulty circulation, such as channeling, and prevents the pressure from building up to the danger point. The depth indicator permits the proper depth of dye liquor to be maintained in the kettles, thus assuring the correct ratio of liquor to stock at all times.

• JOINS CARBIDE & CARBON

Thomas W. Nale, M.D., formerly plant physician of the South Charleston works of Carbide and Carbon Chemicals Corporation, has been appointed assistant manager of the Industrial Toxicology Department of Union Carbide and Carbon Corporation, New York.

During the past few years, the activities of this department have expanded greatly as a result of the production of many new items by several units of the Corporation and especially because of the large number of new synthetic organic chemicals produced and introduced on the market by Carbide and Carbon Chemicals Corporation. Dr. Nale's assignment to this department will greatly increase its capacity for carrying on this work.

• TEXTILE PROCESSING HAND BOOK

Announced for publication early next spring by Inter-Trade Publishing Company, is "Textile Processing and Auxiliaries Handbook" a practical reference book for the Textile processing industry. It is being compiled under the joint editorship of Dr. E. W. K. Schwarz and Sidney M. Edelstein. Dr. Schwarz is a chemical consultant for the Textile Industry and Mr. Edelstein is Technical Director of the Textile Chemical Division of the Dexter Chemical Corporation of New York City. Prominent authorities, in both the textile field and in the chemical field, will write the chapters on their specific specialties.

The handbook will be divided into three parts and will furnish in a convenient form the important points involved in all textile processing and the application of the chemicals and auxiliaries used in textile processing.

Part one will contain information on fibers, wet preparation and processing, scouring and bleaching, dyeing equipment, finishing and textile testing. Part two will consist of chapters on water, solvents, and all textile auxiliaries used in textile processing. Part three will deal with testing methods of textile auxiliaries and will contain a selected bibliography on the various subjects of part one and two. The book will be thoroughly indexed with cross references from all sections.

• CYANAMID REORGANIZATION

American Cyanamid Company, 30 Rockefeller Plaza, New York, announced that, effective July 31st, 1946, the business of the American Cyanamid and Chemical Corporation, a subsidiary, was consolidated with that of the parent company, American Cyanamid Company. This consolidation action is in line with the general plan for the simplification of the corporate structure of the Cyanamid organization, the announcement continued, and henceforth the business of the American Cyanamid and Chemical Corporation will be operated as the Industrial Chemicals Division of American Cyanamid Company.

The history of the American Cyanamid and Chemical Corporation dates back to 1929 when American Cyanamid Company acquired the business of the Kalbfleisch Corporation, one of the oldest in the American chemical field and outstanding for its production of chemicals for the pulp and paper industry. The name was later changed to American Cyanamid and Chemical Corporation. To this new subsidiary the company transferred technical service and the production and sale of many industrial chemicals. The company today gives technical service and sells to practically every chemical-consuming industry.

As the Industrial Chemicals Division of American Cyanamid Company, it will handle the sale of insecticides, gypsum products, prussiates, sodium phosphates, case hardeners, rubber accelerators, a full line of industrial explosives including dynamite, blasting powders and electric blasting caps, nitrocellulose for coatings and finishes, phthalic anhydride as a base for vat dyes and as an important constituent of synthetic resins, which are revitalizing the paint, lacquer, varnish and enamel industries. It is also a large dis-

tributor of chemical specialties serving particularly the rubber, textile and leather industries.

A similar consolidation is planned with regard to Lederle Laboratories, Inc., Pearl River, N. Y., the Cyanamid unit which produces pharmaceutical and biological products for human and veterinary use. This consolidation is expected to become effective in the near future.

• GENERAL DIRECTOR, Du PONT DYESTUFFS SALES

Ambrose R. Chantler, who has been director of domestic dyestuffs sales for the Du Pont Company since 1929, assumed the new position of general director of sales of the dyestuffs division on August 1, it has been announced by Dr. Ivan Gubelmann, manager of that division.

Mr. Chantler was succeeded as director of domestic dyestuff sales by Eric J. Monaghan who has been assistant director since 1934.

Dr. Miles A. Dahlen, assistant director of the dyestuffs division's technical laboratory at Deepwater Point, N. J., since 1938, became assistant director of domestic dyestuffs sales.

This reorganization centralizes all sales activities of the dyestuffs division.

• MATHIESON APPOINTMENTS

The Mathieson Alkali Works, chemical manufacturers, has announced the appointment of Harold R. Dinges as District Sales Manager for a newly defined sales area to be serviced from Charlotte, N. C. O. J. Theobald, Jr., has been appointed to assist Mr. Dinges who will supervise company sales activities in Virginia, North and South Carolina and parts of West Virginia and Tennessee.

Harold R. Dinges

Mr. Dinges has been active in varied sales activities in the Mathieson Charlotte and Providence, R. I., offices since joining the company in 1941. He has contributed substantially to the development of sodium chlorite, bleaching agent

O. J. Theobald, Jr.

used in the textile field and other industries. He also assisted in the development of the Mathieson steamer which has made it possible to scour in the open width and in a continuous operation any weight and any width of goods, or to bleach goods, in the same manner, by any of the hot bleaching processes.

Mr. Theobald, a member of the Mathieson organization since 1932, served as sales representative until his present appointment and has represented Mathieson in its Chicago, St. Louis, Cincinnati and New Orleans offices.

• ARMY-NAVY SPECIFICATIONS

Several hundred Army-Navy specifications for various products are now on sale (in photostat and microfilm form) by the Office of Technical Services, Department of Commerce. Each specification describes Army-Navy requirements for material and workmanship, methods of sampling and testing, packing and marking for shipment, and other applicable requirements.

Business men may address inquiries concerning the availability of any particular specification to the Reference Service Section, Library and Reports Division, Office of Technical Services, Department of Commerce, Washington 25, D. C. Prices vary with the length of the specification.

• CHECK LIST AVAILABLE

The Business Service Check List, originally established by the Department of Commerce for use by trade associations, chambers of commerce, trade publications, and business research and public libraries, is now available to individual businessmen.

The Check List, which is published weekly, was initiated on March 18, 1946, as part of a new program designed to speed up the Department's informational service to business groups.

Each issue lists by subject all business information, including press releases, speeches, articles, reports, surveys and periodicals, published by the Department of Commerce during the preceding week, with a brief description of the items.

Subscribers to the Business Service Check List are given return-mail service (or collect wire or telephone service if desired) on all orders for material listed.

Beginning with the July 12 issue, the Check List will appear in printed form and will be available free of charge only to public libraries and educational institutions. In all other instances, an annual subscription price of $1 will be charged for the service.

Subscriptions to the Business Service Check List should be addressed to the Department of Commerce, Special Business Service Desk, Room 2830-B, Washington 25, D. C. Checks or money orders covering subscriptions should be made payable to the Treasurer, United States of America.

• APPOINTED DIRECTOR, TEXTILE CHEMICALS

Monsanto Chemical Company has announced the promotion of Dr. Donald H. Powers, Director of Textile Chemicals Sales Development in its Merrimac Division at Everett, Mass., to Director of the Division's Textile Chemical Department. The promotion placed Dr. Powers in charge of sales, sales promotion and research activities of the department.

Donald H. Powers

Nate L. Crabtree, former advertising agency executive recently made special assistant to General Manager D. S. Dinsmoor of the Merrimac Division, has been named to take charge of Sales Promotion activities of the Textile Chemical Department.

Sawyer Sylvester was named to head the Department's Technical Section.

CALCO CHEMICAL DIVISION • AMERICAN CYANAMID COMPANY

Bound Brook, New Jersey

New York • Chicago • Philadelphia • Boston • Charlotte • Providence

COMMONWEALTH
COLOR & CHEMICAL CO.

More than thirty years' experience in the manufacture of Chemical Specialties, Dyestuffs and Dyewoods for the Textile and Allied Trades . . .

MAIN OFFICE AND WORKS:
NEVINS, BUTLER and BALTIC STREETS, BROOKLYN 17, N. Y.
PHILADELPHIA • CHICAGO • GLOVERSVILLE • MONTREAL

RAPIDASE

for de-sizing cottons, rayons and mixed goods

•

Assures rapid, dependable de-sizing.

•

Our technical staff always at your service.

•

WALLERSTEIN COMPANY, INC.
180 MADISON AVENUE • NEW YORK 16

QUALITY RICHMOND PRODUCTS

Something Really NEW for WOOL and WORSTED

Scours either neutral or acid
Contains NO Soap
Does not break in hard water

•

SCOURCLEAN X

The newest idea for WOOL and WORSTED

•

Send for FREE Sample

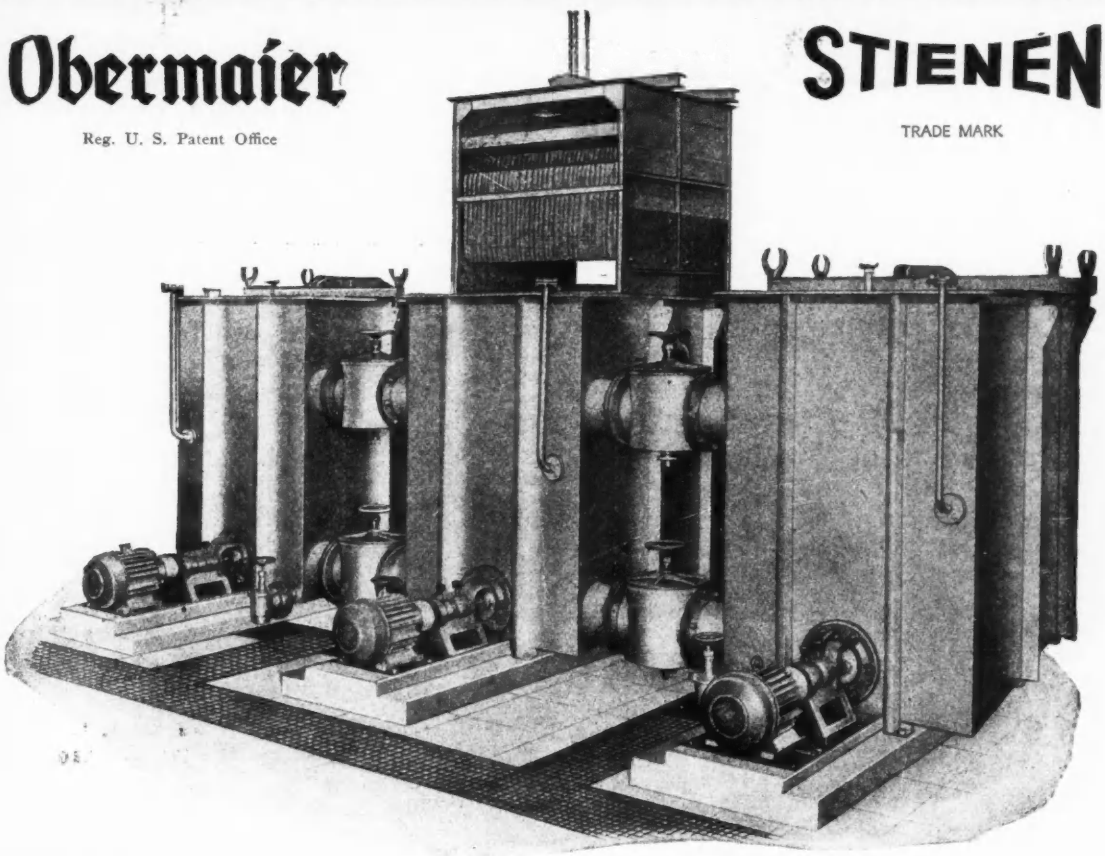
RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

Obermaier

Reg. U. S. Patent Office

STIENEN

TRADE MARK



PRESENTING THE NEW MODEL GAWET WORSTED SKEIN DYEING MACHINE

Five units, each, of 200 pounds capacity, can be used singly or, by opening the connecting valves, in any combination of units up to five, for one color.

1000 pound batches, in one uniform color, or five 200 pound batches of different colors, can be dyed at one time. There is no possibility of felting as the yarn remains stationary.

All Stainless Steel Construction

Standard Fabricators

INCORPORATED

355 WALTON AVENUE • NEW YORK 51, N. Y.

BUILDERS OF

COTTON AND WOOL DYEING MACHINES—
FOR BEAMS—PACKAGES—RAWSTOCK—SKEINS—RAYON CAKES—DYE SPINDLES—PERFORATED TUBES
CENTRIFUGAL PUMPS—EXTRACTORS AND DRYERS

AGENTS

BOLIVIA & CHILE
Schneitzer & Cia. Ltd.
La Paz, Bolivia—
Santiago, Chile

ARGENTINA & URUGUAY
Laser, Fleischer & Cia.
Paseo Colon 464
Buenos Aires, Argentina, S. A.

BRAZIL
Escritorio Tecnico e Comercial
"Lodovico Lazzati Ltda."
Caixa Postal 994
Sao Paulo, Brazil, S. A.

COLOMBIA
Fernando
Cabo Olozaga
Apartado Aereo 37-68
Bogota, Colombia, S. A.

INDIA
Associated
Textile Engineers
43 Forbes Street
Fort, Bombay, India

DYESTUFFS

•

SPECIALTIES

BICK & CO., Inc.
Manufacturing Chemists
Reading, Pa. Charlotte, N. C.

SYNTHETIC DETERGENTS
ANILINE COLORS
NATURAL DYESTUFFS
SIZINGS and FINISHING MATERIALS

UNITED
CHEMICAL PRODUCTS
CORPORATION
Main Office:
753 MONTGOMERY STREET • JERSEY CITY 6, N. J.
Plant:
YORK AND GOLGATE STREETS •• JERSEY CITY 2, N. J.
Branches:
GREENSBORO, N. C. • PAWTUCKET, R. I.
Western Agents: CHEMICAL PRODUCTS CO., AURORA, ILL.

A COMPLETE LINE OF
DYESTUFFS
for all branches of
TEXTILE DYEING
AND PRINTING—
PAPER AND LEATHER
★
Specializing in fast colors
NOVA CHEMICAL CORPORATION
147-153 Waverly Place
New York 14, N. Y.
WAREHOUSES IN NEW YORK and CHARLOTTE, N. C.

clear colors start with clean fabrics

To have clear, uniformly dyed shades in finished fabrics, dyers must start with material that is really clean—not only free from visible dirt but clean as shown by chemical analysis.

Lime soap film, for example, is usually invisible, but its presence may result in cloudy, skimpy or streaky dyeing.

The remedy is Calgon*—in Kier boiling for cotton, in scouring and rinsing operations for wool or rayon, to make sure of the cleanliness that is essential to good dyeing.

In some cases the dyer may have trouble with certain dyes that crock more than others, with dyes that do not penetrate very well or that are difficult to get into solution. Scum may form on dyebaths, or they may contain suspended particles of insoluble precipitates.

Again, the remedy is Calgon—used directly in the dyebath.

The use of Calgon in various textile processes means fewer rejects, more dyed goods of the highest quality—and consequently better profits.

The technical facilities of Calgon, Inc. are at the service of textile operators. Write for full information concerning your problems, or send for the booklet "Calgon Data for the Textile Chemist."

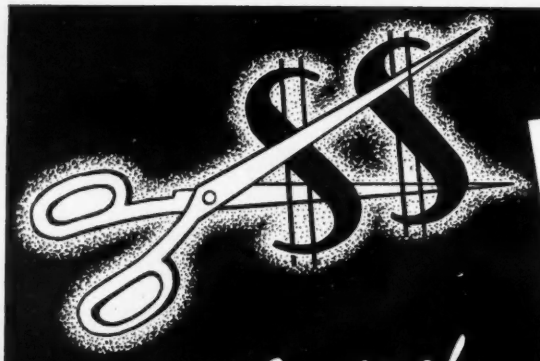
*T. M. Reg. U. S. Pat. Off.

HAGAN HALL BUROMIN CALGON

calgon, inc.

A SUBSIDIARY OF HAGAN CORPORATION

HAGAN BUILDING PITTSBURGH 30, PA.



Cut Costs of Production . . . NO SPECK DYEING!

● By the use of Logwood, you automatically eliminate the expense and trouble of carbonizing or speck dyeing, since Logwood thoroughly covers all specks, burrs or foreign matter.

IF YOU DYE NYLON: The fibre form of the Du Pont basic raw material can be dyed with Logwood with excellent results.

Send for our booklet:
"Advantages of Dyeing Wool with Logwood"

AMERICAN DYEWOOD CO.
22 EAST 40th STREET NEW YORK

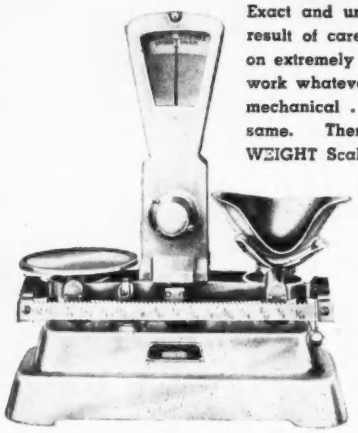
BRANCHES:
BOSTON • PHILADELPHIA • CHICAGO

CANADIAN REPRESENTATIVES:
CANADA COLORS & CHEMICALS, LTD., TORONTO
PRESCOTT & CO., Reg'd, MONTREAL

ANILINE DIVISION:
NEW YORK COLOR & CHEMICAL CO.
BELLEVILLE, N. J.

LOGWOOD - *first choice for fast blacks*

For Exact and Unvarying Color Match . . .



Exact and unvarying color match is the result of careful compounding performed on extremely accurate scales. No guesswork whatever. The operation is strictly mechanical . . . the results always the same. There are several EXACT WEIGHT Scales for dye work. Each fits its particular requirement. When you do fine color control use Model No. 42-A (illustrated) 1/100 oz. beam graduations, capacity to one pound. For extremely fine work use Model No. 51 (1/1000 oz. graduations —capacity to 4 ozs. Full details covering these scales are available in the new 1946 catalog.

INDUSTRIAL PRECISION
Exact Weight Scales

THE EXACT WEIGHT SCALE COMPANY
13 W. Fifth Avenue Columbus 8, Ohio
Dept. H, 783 Yonge St., Toronto, Canada

QUALITY **RICHMOND** PRODUCTS

Less Handling with

AFTER CHLOR
Eliminates 3 to 5 Handlings

Bleach with
Hypochlorite
Rinse and Use

AFTER CHLOR
THAT'S ALL!

Write for FREE Sample

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

THIS TEAM PULLS *Smoothly* IN HOSIERY SCOURING

Whether your choice falls on soap or synthetic detergents for scouring and dyeing rayon or nylon hosiery, you can count on topnotch results with either Olate or Orvus. A glance at some of the characteristics of these two time-tested cleansing agents will guide you in your choice.

Olate

A pure, neutral soap of exceptionally low titer.

Fast dissolving—free rinsing.

Fluid solutions wet out fibers quickly, evenly, thoroughly—guard against uneven dyeing.

Excellent emulsifying properties. Holds spinning and coning oils firmly in suspension until they are flushed.

Resists oxidation, rancidity and odor development.

ORVUS*

Provides thorough, uniform penetration of dyestuffs.

Thoroughly emulsifies and removes coning and knitting oils.

Prevents lime soap specks and oil spots.

Minimizes danger of non-uniform dyeing on cotton tops and feet.

Eliminates streakiness and blotches.

Procter & Gamble

*TALK OVER YOUR ORVUS NEEDS WITH YOUR PROCTER & GAMBLE SALESMAN.

impartial survey shows...

"USERS OF MILDEW-PROOFING COMPOUNDS WANT DURABILITY"

G-4 PROVIDES PERMANENCE OF PROTECTION

An impartial survey, in which 212 textile mills participated, revealed that durability and permanence of protection are desirable and essential qualities for mildew-resistant finishes. Givaudan's G-4* has long been known for its exceptional stability and permanence over a broad range of temperatures, both during processing and in use. Its flexibility and water resistance coupled with its non-corrosive nature assure fabric life-freedom from mildew and rot. G-4 is economical, non-toxic, non-irritating, and it does not affect fabric processing.

Enlarged facilities for G-4 production now enable Givaudan to meet the expanded mildew-resistant requirements of the textile industry.

*Dihydroxy Dichloro Diphenyl Methane

"BUY WISELY . . . BUY GIVAUDAN"

Givaudan-Delawanna INC.

Industrial Products Division · 330 WEST 42nd STREET · NEW YORK 18, N. Y.

pluramines*

Grades:—AH 100%, WS 100%, DY 100%

For the lubrication of cotton and rayon yarns to improve knitting and weaving qualities. May be added to the dye bath or applied as after treatment.

Ask for details and samples

KEARNY

MANUFACTURING CO., INC.

KEARNY, N. J. GREENVILLE, S. C.

Montreal
Mexico

KMC PRODUCTS

Sao Paulo
Buenos Aires
Antwerp

Reg. U. S. Pat. Off.

LeaTex

The name that means leadership in

CHEMICAL SPECIALTIES

for the

TEXTILE INDUSTRY

"Always Reliable"

LEATEX CHEMICAL COMPANY
2722 N. HANCOCK ST., PHILADELPHIA, PA.

Pretty as a picture . . .

Not all women can be "pretty as a picture" —yet every woman strives to create the illusion of beauty. And, of course, the world of fashion is her source of inspiration —fine fabrics her greatest ally!

That explains why so many of America's leading mills, converters, finishers and dyers have turned to Colgate-Palmolive-Peet for high-quality wetting, fulling, scouring and dispersing agents.

There is a C.P.P. soap or synthetic detergent for every fabric—for every processing problem. Ask your local Colgate-Palmolive-Peet representative for detailed information on the full line of C.P.P. processing agents made for the textile industry. Or, write to Industrial Department, Colgate-Palmolive-Peet Co.

•

COLGATE WHITE SOAP FLAKES

ARCTIC CRYSTAL FLAKES

BADGER FLAKES

ARCTIC SYNTEX "A" AND "T"

COLGATE FORMULA 10

Colgate-Palmolive-Peet Co.

JERSEY CITY 2, N. J. ATLANTA 3, GA. CHICAGO 11, ILL. MILWAUKEE 4, WISC. KANSAS CITY 3, KANS. BERKELEY 2, CALIF.

trouble free Nylon Knitting with NYASIL

Nyasil used in the trough, makes nylon yarn more pliable. Needles and sinkerheads do not become clogged or sticky, breakage is prevented and production is uninterrupted. Nyasil causes no trouble in the dye bath since it contains no contaminating impurities. Nyasil is a pre-war *proved* product—proved by performance in the total production of nylon hosiery in many of the nation's leading mills. Nyasil is economical since a pint is sufficient in 30 gallons of water.

ORDER TODAY

5, 10, 15, 30 and 55 gallon containers

Zurnoil TEXTILE CHEMICALS

Specialties for
SCOURING
STRIPPING
PENETRATING
FINISHING

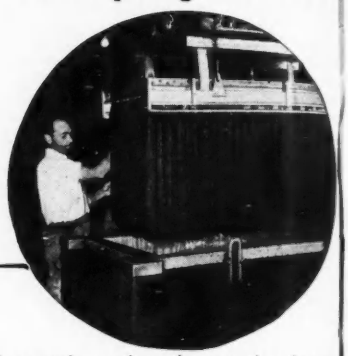
Oils for all textile conditioning requirements

O. F. ZURN COMPANY

PHILADELPHIA 32, PA.

KNOXVILLE, TENN. • HAMILTON, ONT., CANADA

Clearer, more even dyeing, faster with Laurel WOOL SCOURING COMPOUNDS



YOU are sure of clean, soft wools and worsteds, clearer, more even dyeings when you use Laurel Scouring Compounds. Known for their speedy detergent action and used by leading mills for over thirty-five years, Laurel Scouring Compounds remove grease, oil, dirt quickly, economically, without injury to fibers. Keep mineral oils in suspension. Leave wool lofty and with soft hand... level dyeing. Available now. Send for trial order today. Let Laurel Scouring Compounds help you improve quality production and deliveries.

LAUREL WOOL OILS • LAUREL FULLING COMPOUNDS

• SOAPS • OILS • FINISHES •

LAUREL SOAP MANUFACTURING CO., Inc.

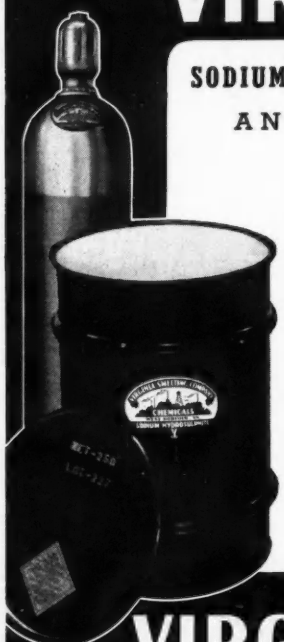
Wm. H. Bertolet's Sons • *Established 1909*

WAREHOUSES—PATERSON, N. J. • CHATTANOOGA, TENN. • CHARLOTTE, N. C.

OFFICES—2601 East Tioga Street, Philadelphia 34, Pa.

VIRGINIA

SODIUM HYDROSULPHITE AND SO_2



Progressive textile processors are cutting costs with specialized equipment, developed by VIRGINIA, for application of these two textile stand-bys. Ask your VIRGINIA representative about the "Hydromiser" for regulating the feed of Sodium Hydrosulphite, and VIRGINIA'S semi-automatic antichlor method for controlling SO_2 concentrations in the sour box.

Offices and Stocks in:
New York • Boston
Philadelphia
Detroit • Charlotte

VIRGINIA

VIRGINIA SMELTING COMPANY

WEST NORFOLK, VIRGINIA

"developed" colors

CALL FOR

SOLVAY
SODIUM NITRITE

SOLVAY

THE QUALITY OF A FINE DYE is easy to recognize in the finished fabric. The sure way to such quality in dyes and dyeing is to use SOLVAY Sodium Nitrite for developing the colors of the azo dyes.

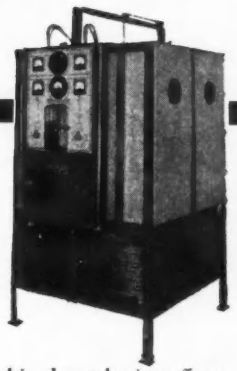
THERE IS ALWAYS a reason for the superiority of a product . . . SOLVAY Sodium Nitrite is of an expressly developed U.S.P. Grade, whose fine crystals tend to remain free-flowing. Its *quality* insures better results for cotton, rayon, silk . . . true color fastness at minimum cost. Be sure to specify SOLVAY Sodium Nitrite.

SOLVAY SALES CORPORATION
Alkalies and Chemical Products Manufactured by The Solvay Process Company
40 Rector Street — New York 6, N. Y.

BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit • Houston
New Orleans • New York • Philadelphia • Pittsburgh • St. Louis • Syracuse

ACCELERATED TESTING for WEATHERING and FADING OF MATERIALS

ATLAS TWIN-ARC WEATHER-OMETER

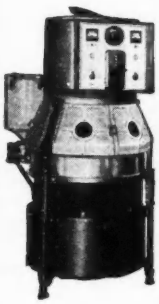


Faithfully duplicates the combined weathering effects of sunlight, rain, heavy dew and thermal shock; accelerated to reduce years of actual weathering to a few days of testing.

Full automatic control of light and water periods is provided by the Atlas cycle timer unit which can be set to meet standard and special requirements of weathering tests. After setting exposure cycles on the control panel, the Weather-Ometer can be safely left in continuous operation without attention.

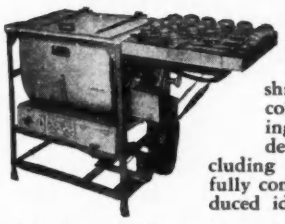
The Atlas Weather-Ometer proves the durability of materials under exact conditions of weathering found in actual use in outdoor exposure.

ATLAS FADE-OMETER



The recognized standard testing machine for determining the fastness to light of any material or finishes. Specimens are rotated around the Atlas Enclosed Violet Arc — the closest approach to natural sunlight —in masked holders. Automatic temperature control to within ±3° F. and humidity regulated by a constant reservoir according to requirements of tests. Operation is completely automatic without attention from operator; can be left in continuous operation overnight.

ATLAS LAUNDER-OMETER



Standard laboratory washing machine of A.A.T.C.C. Tests washing action, textile shrinking, staining, and color fastness to dry cleaning solvents, soaps and detergents. All factors, including washing action, carefully controlled—can be reproduced identically at any time.

Sales Representatives in Principal Cities All Over the World

ATLAS ELECTRIC DEVICES CO.
361 West Superior Street, Chicago 10, Illinois

HOWES PUBLISHING COMPANY

A. P. HOWES, PRESIDENT

Metropolitan Tower, New York 10, N.Y.

Since announcing the Silver Jubilee Issue of AMERICAN DYESTUFF REPORTER, to be published December 2, 1946, we have received many telephone calls and letters requesting additional information. The questions asked and the answers given were:

Question: Will this issue take the place of your Annual Processing Review Number?

Answer : Yes, it will. However, the list of new dyestuffs and chemical specialties developed during 1946 will appear in our issue of December 16--the issue following the Silver Jubilee Issue.

Question: Can we use regular product advertisements in the Silver Jubilee Issue?

Answer : Yes, we shall accept regular advertising pages; but because this issue is to be a permanent record of individual contribution to chemical achievement, we recommend the preparation of copy that presents factual, historical information.

Question: If we take four or more pages in which to present a complete history of our organization, can you help in the preparation of the article and the typographical arrangement of our pages?

Answer : Yes, we can help where necessary, as we have engaged a competent writer--familiar with this kind of work--whose services will be available.

Question: Will there be an increase in the cost of advertising pages?

Answer : No, there will not be an increase. Your regular rate will apply.

We undoubtedly shall be called upon to answer other questions as they arise; therefore, we suggest you watch for further announcements in the REPORTER.

Very truly yours,

M. D. Reeser
Advertising Manager

MDR:s

?

Have you ordered

ADVERTISING SPACE

in the

1946

YEAR BOOK

of the

AMERICAN ASSOCIATION

of

TEXTILE CHEMISTS

and

COLORISTS

•

A full page advertisement in this important, permanent reference book costs only

$125.00

Order your advertising page immediately and bring your products to the attention of the technical men who BUY and USE THEM.

•

HOWES PUBLISHING COMPANY
One Madison Ave., New York City 10, N. Y.

For Rewetting In
SANFORIZING

is quick and effective

•

Also a fast wetting agent and penetrant for dyeing packages, piece goods, skeins and raw stock.

•

Or wherever fast, even wetting and penetration are necessary.

Kali

MANUFACTURING CO.
Manufacturing Chemists
427 Moyer Street · Philadelphia 25, Pa.

Have you ordered a Binder for your Reporter copies?

Maroon leatherette, gold lettered, large enough to hold twenty-six issues, only $2.50 post-paid.

Please send check with order to:

AMERICAN DYESTUFF REPORTER
ONE MADISON AVENUE
New York 10, N. Y.

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.

SULPHUR BLACK WANTED, about 20,000 lbs. per month. Please write D. L. Wilkoff Co., 2922 Grant Building, Pittsburgh 19, Pa., or New York Office, 56 Beaver Street, Whitehall 4-6685.

CONFIDENTIAL EMPLOYMENT SERVICE — We invite correspondence (confidential) with Dyers, Chemists, Colorists, Superintendents, Master Mechanics, Office Managers, and others seeking positions and with employers seeking high-grade men to fill vacancies or to make replacements. Charles P. Raymond Service, Inc., 294 Washington St., Boston, Mass. Over 45 years in business.

POSITION WANTED: Superintendent of dyeing, 21 years woolen mill experience, 14 years in dyehouse doing laboratory work, practical operation of all machines and application of dyestuffs. 9 years Superintendent of dyeing in present mill. Experienced with rawstock, yarn and piece dyeing also wool scouring and carbonizing. Have dyed wool, cotton, nylon and aralac. 35 years old, married, one child. Prefer New England. Write Box 101.

POSITION WANTED: Textile chemist and colorist, trouble shooter and demonstrator desires sales position. Domestic or Foreign. Associated for the past 15 years with a nationally known dyestuff manufacturer. 35 years of age, married and one child. Excellent references furnished upon request. Write Box 103.

WANTED: Salesman, established chemical manufacturer undertaking progressive expanding program, seeks experienced representatives to sell low cost chemical products in bulk, as soaps, degressers for textile processing and finishing fields. Commissions drawing exclusive territory. Write Box 105.

POSITION WANTED: Textile chemist, broad education, with 15 years practical experience in the finishing and dyeing of knitted and woven outerwear woolen fabrics. Also possess knowledge of cloth manufacture from raw material process to finished fabric. Write Box No. 106.

WANTED: In the East, Warp Dyer, must be experienced and capable of learning and developing new processes. Please state experience, references, age and salary expected. Replies held confidential. Write Box 107.

AN UNUSUAL OPPORTUNITY FOR TEXTILE SCHOOL GRADUATES INTERESTED IN SALES CAREER

• YOU need not have actual selling experience but you must be certain you have a flair for selling and a real desire to make a permanent career in this profitable field. Technical training in recognized technical school is a requisite . . . our representatives must be able to meet practical textile executives on their own level. Personality is of prime importance. We will give complete technical sales-training before assignment to territory. Openings are in southern area.

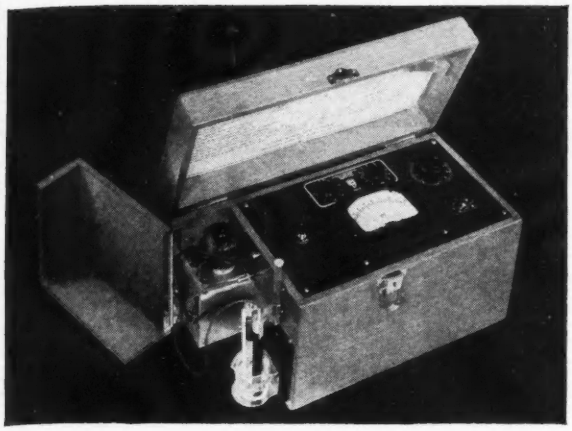
You will be associated with one of the most progressive manufacturers of trademarked textile chemical specialties.

Write in complete detail to—

Box 100
AMERICAN DYESTUFF REPORTER
One Madison Avenue
New York 10, N. Y.

WANTED

Weaving Mill Superintendent. Splendid opportunity for young man with executive ability desiring to locate in Lawrence, Massachusetts. Must have college degrees and past experience in weaving. Applicant should state age, education, previous experience and salary desired. All replies confidential. Write Box 104.



pH INDICATOR FOR "EVERYBODY"

Here's the pH Indicator for the man who is *not* a pH expert. It's carried around and used wherever desired—in plants as well as labs. It's sturdy and dependable as a temperature indicator. It will stay on the job. To use it, you just make 3 simple adjustments, then put the sample into the beaker and see where the needle points. Its scale is substantially longer and easier to read than in any comparable Indicator.

This Indicator is fine for laboratories, kitchens, refrigerated chests, packing rooms and power plants. "Sticky" weather or surroundings won't affect it, unless the relative humidity is over 95 per cent and the ambient temperature higher than 85 F. Solution to be checked can be at any temperature to 50 C. (120 F.). Thick solutions and "soft" solids can be checked almost as easily as slurries or clear liquids. Nearby electrical equipment won't affect the Indicator.

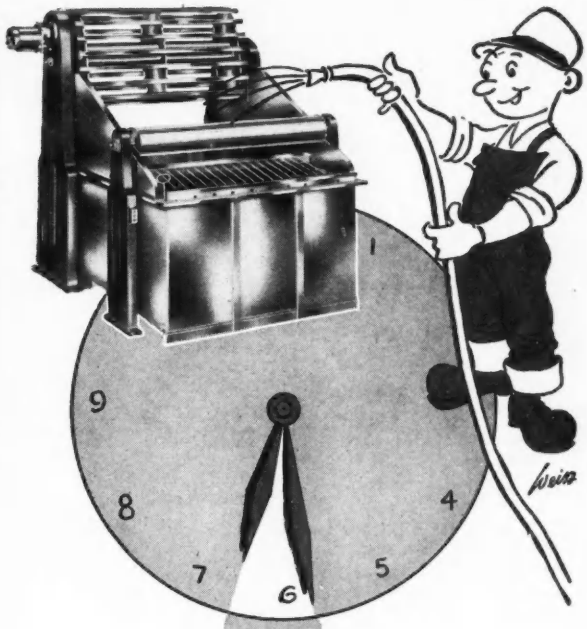
Further details are in Catalog E-96 (2), sent on request.

LEEDS & NORTHRUP COMPANY, 4965 STENTON AVE., PHILA. 44, PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Jrl Ad E-96(25a)



2-minute changeovers for busy dyehouses

No Stripping

No Boil Outs

No Discoloration

No Loss in Steam or Water

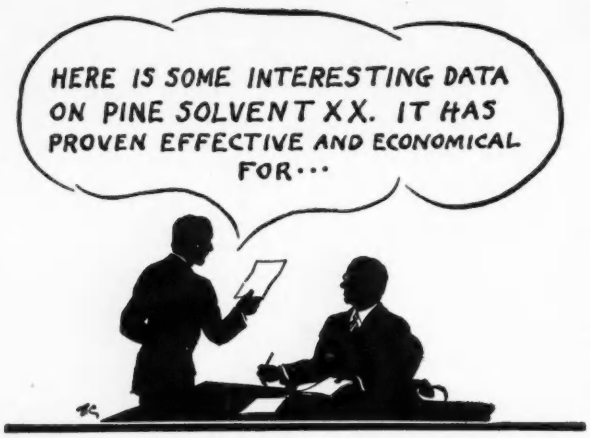
The Blickman Stainless Steel dyebox gives you more runs per day at lower cost. A quick rinse and the box is clean. In man-hour savings alone, many operators report that the equipment pays for itself in a short time. Send for all the facts.

Send for folder "3 for 5"—showing Blickman Stainless Steel Dyeing Equipment.

S. BLICKMAN, INC.

10. GREGORY AVENUE • WEEHAWKEN, N. J.

Manufacturers of stainless steel textile equipment, dye boxes, linings, cylinders, dry cans, rolls, hoods, tanks



COTTON: In the kier, Pine Solvent XX brings the liquor in contact with every fiber, leaves uniform bottoms that dye and finish more evenly. Boiling time is cut. Fibers are softer, fuller, more resistant to age-discoloration.

WOOL: Pine Solvent XX is valuable in raw-wool scouring . . . irreplaceable in fulling. From the raw stock it produces clean, soft, really white wool in prime condition for storage or further processing. In the fulling mill, it cuts time as much as 30% . . . costs no more . . . helps you meet contract delivery dates on time.

RAYON: In boiling off, Pine Solvent XX rapidly emulsifies gelatinous materials . . . is safe for the most delicate fabrics. Used in dyeing, it makes the fabrics wet out and sink quickly.

DYEING: Pine Solvent XX makes dye liquor penetrate the hardest fibers and heaviest seams. It gives an even, level deposit of dyestuff of uniform depth throughout every fiber. Loose dyestuff and impurities are suspended for washing out completely.

PRINTING: In printing paste, Pine Solvent XX wets pigments thoroughly, disperses them evenly, and holds them in suspension without agglomeration until the design is on the fabric. Designs are sharp, colors bright and clear, no specks are formed.

CUT TIME AND COST– IMPROVE RESULTS IN ALL WET PROCESSING WITH BURK-SCHIER PINE SOLVENT XX

Burk-Schier Pine Solvent XX Reduces Surface and Interfacial Tensions . . . Wets, Penetrates, Suspends, Disperses . . . Aids Detergents and Dyes. A Little Does a Lot and Does It Well.

SCOURING WETTING PINE-SOLVENT BLEACHING DYEING

BURKART-SCHIER CHEMICAL CO.

BURK-SCHIER CHATTANOOGA, TENNESSEE BURK-SCHIER

PENETRANTS • SOFTENERS • SOLUBLE OILS FINISHES

INDEX TO ADVERTISERS

Alrose Chemical Co.
Althouse Chemical Co.
Amalgamated Chemical Corp.
American Aniline Products, Inc. III
American Cyanamid & Chemical Corp. Back Cover
American Cyanamid Co. (Textile Resin Dept.) VIII
American Dyewood Company XXXII
American Viscose Corp.
Ansul Chemical Company
Aridye Corp. XV
Arkansas Company, Inc. XX
Arnold-Hoffman & Co., Inc. XLIII
Atlantic Chemical Co.
Atlas Electric Devices Co. XXXVII

Becco Sales Corp. XIII
Bick & Co., Inc. XXX
Blickman Co., Inc., S. XLI
Borne Scrymser Co.
Burkart-Schier Chemical Co. XLII
Butterworth Sons Co., H. W. VI, VII

Calco Chemical Division, American Cyanamid Co. XXVII
Calgon, Inc. XXXI
Campbell & Co., Inc., John XVIII
Carbic Color & Chemical Co., Inc. XXIV
Carbide & Carbon Chemicals Corp.
Ciba Company, Inc.
Colgate-Palmolive-Peet Co. XXXV
Commonwealth Color & Chemical Co. XXVIII

Dexter Chemical Corp.
Drew & Co., Inc., E. F. XXVI
Du Pont de Nemours & Co., E. I.
Dyestuffs Division Front Cover

Electro Metallurgical Co. XLIV
Emery Industries, Inc.
Exact Weight Scales Co. XXXII

Fancourt & Co., W. F.

Geigy Company, Inc.
General Chemical Co.
General Dyestuff Corp. IX
Givaudan-Delawanna, Inc. XXXIV

Hart Products Corp.
Hardesty Co., W. C.
Hooker Electrochemical Co. X

Industrial Rayon Corp.
International Salt Co., Inc.

Johnson & Son, Inc., S. C. XVII

Kali Manufacturing Co. XXXIX
Kearny Mfg. Co., Inc. XXXIV
Kelco Co.

Laurel Soap Mfg. Co., Inc. XXXVI
Leatex Chemical Co. XXXIV
Leeds & Northrup Co. XLI

Mathieson Alkali Works, Inc.
Monsanto Chemical Co.

National Aniline Division, Allied Chemical & Dye Corp. XXI
National Carbon Co. XXIII
National Milling & Chemical Co.
National Oil Products Co. XIV
National Starch Products, Inc.
Nova Chemical Corp. XXX
Nuodex Products Co., Inc.
Nyanza Color & Chemical Co. IV

Onyx Oil & Chemical Co. XVI

Pabst Sales Company
Perkins & Sons, Inc., B. F. XII
Philadelphia Quartz Co.
Procter & Gamble XXXIII

Ravon Processing Co. of R. I.
Refined Products Co. XIX
Richmond Oil Soap & Chemical Co., Inc. XXVIII, XXXII
Rohm & Haas Co.
Royce Chemical Works
Rumford Chemical Co.

Sandoz Chemical Works
Scholler Bros., Inc. Third Cover
Socony-Vacuum Oil Co., Inc. XI
Solvay Sales Corp. XXXVII
Sonneborn Sons, Inc.
Standard Brands, Inc.
Standard Chemical Products, Inc.
Standard Fabricators Inc. XXIX
Stein, Hall & Co., Inc.

Tennessee Eastman Corp.

Union Carbide & Carbon Corp. XXIII, XLIV
United Chemical Products Corp. XXX

Van Vlaanderen Machine Co. V
Virginia Smelting Co. XXXVI

Wallerstein Co., Inc. XXVIII
Warwick Chemical Co. Second Cover
Wolf & Co., Jacques

Young Aniline Works
Young Co., J. S.

Zinsser & Co., Inc.
Zurn Co., O. F. XXXVI

Obtain Maximum Light Fastness from Your Colors

Almost all substantive, or cationic, softeners change the shade of dyestuffs on fabrics and seriously reduce their fastness to sunlight. Not so with Ahcovels E and F however. They do NOT alter shades and do NOT affect the relative light fastness of any dyestuff.

Yet they both have these valuable additional properties:—

1. Give velvety soft finish.
2. Resistant to repeated washings and dry cleansings.
3. White paste products, producing non-greasy, odorless finish, which will not discolor or develop odor with heat, age or light.
4. Easy to apply; exceptionally economical to use.

AHCOVEL-E

— was originally developed for hard twisted fabrics, where good draping qualities are normally difficult to obtain — such as hard twist acetates and nylons. It flexibilizes the fibres.

*Trademark Reg. Patented

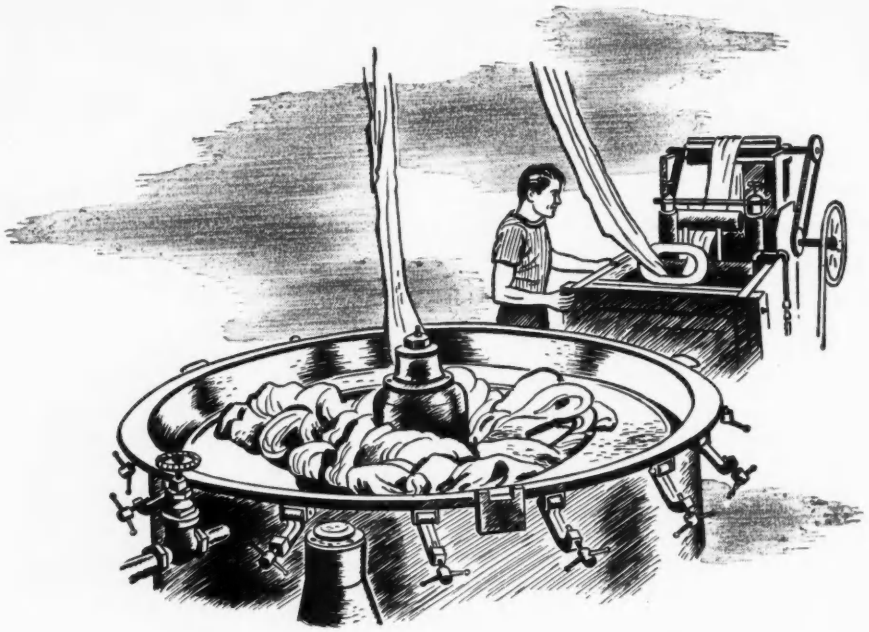
ARNOLD, HOFFMAN & CO., INC.

MANUFACTURING CHEMISTS

PROVIDENCE, RHODE ISLAND

ESTABLISHED 1815 • PLANTS AT DIGHTON, MASS. & CHARLOTTE, N. C.

NEW YORK BOSTON PHILADELPHIA CHARLOTTE



RESISTS CHEMICALS

Stainless steel is unaffected by corrosive media

This centrifugal machine, constructed entirely of stainless steel, recovers chemicals for re-use during the process of making Aralac protein-base textile fiber. Stainless steel is used here because it is not corroded by the action of the chemicals. Textile mills use stainless steel for much of their equipment because it is easily cleaned, is durable and rust-resistant, and because its smooth surface will not snag delicate fabrics. These same qualities make stainless steel highly desirable for equipment in many other industries as well.

If you are interested in the many uses of stainless and other alloy steels, ask to receive the monthly publication, ELECTROMET REVIEW.

If you need information on the production, properties, or fabrication of these steels, write our Technical Service Department. We do not make steel, but we do produce the ferro-alloys which are used in its manufacture, and our engineers have accumulated a fund of information on the use of stainless steel in many industries.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

STAINLESS STEEL — BEAUTIFUL ENDURING STRONG TOUGH

12, 1946